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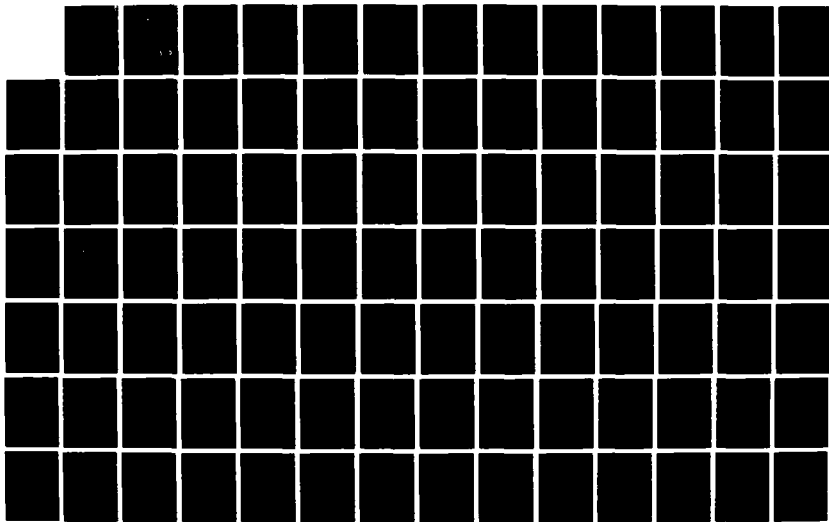
F-14 WING OUTER PANEL FATIGUE TEST SPECTRUM(U) NAVAL  
AIR DEVELOPMENT CENTER WARMINSTER PA AIR VEHICLE AND  
CREE SYSTEMS TECHN OLOGY DIRECTORATE G S SEIDEL ET AL.  
APR 87 NADC-87056-60

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**AD-A193 828**



# F-14 WING OUTER PANEL FATIGUE TEST SPECTRUM

**Air Vehicle and Crew Systems Technology Department  
NAVAL AIR DEVELOPMENT CENTER  
Warminster, Pennsylvania 18974-5000**

## FINAL REPORT

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ELECTE  
APR 13 1988  
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Prepared for  
NAVAL AIR SYSTEMS COMMAND  
Department of the Navy  
Washington, D.C. 20361-5300

88-1-754

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## REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION <b>UNCLASSIFIED</b>		1b. RESTRICTIVE MARKINGS <b>N/A</b>	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S) <b>NADC-87056-60</b>		5. MONITORING ORGANIZATION REPORT NUMBER(S) <b>N/A</b>	
6a. NAME OF PERFORMING ORGANIZATION <b>NAVAL AIR DEVELOPMENT CENTER</b>	6b. OFFICE SYMBOL (If applicable) <b>6041</b>	7a. NAME OF MONITORING ORGANIZATION <b>N/A</b>	
6c. ADDRESS (City, State, and ZIP Code) <b>WARMINSTER, PA 18974-5000</b>		7b. ADDRESS (City, State, and ZIP Code) <b>N/A</b>	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION <b>NAVAL AIR SYSTEMS COMMAND</b>	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER <b>N/A</b>	
8c. ADDRESS (City, State, and ZIP Code) <b>DEPARTMENT OF THE NAVY WASHINGTON, DC 20361-5300</b>		10. SOURCE OF FUNDING NUMBERS	
		PROGRAM ELEMENT NO <b>APN-1</b>	PROJECT NO <b>-</b>
		TASK NO <b>241000 749</b>	WORK UNIT ACCESSION NO <b>TF670</b>
11. TITLE (Include Security Classification) <b>F-14 WING OUTER PANEL FATIGUE TEST SPECTRUM</b>			
12. PERSONAL AUTHOR(S) <b>G. S. SEIDEL, JR. AND A. KOUTSIUROUBAS</b>			
13a. TYPE OF REPORT <b>FINAL</b>	13b. TIME COVERED FROM <b>1/86</b> TO <b>10/86</b>	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
16. SUPPLEMENTARY NOTATION			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	
<b>01</b>	<b>03</b>	<b>03</b>	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) A spectrum of loads for the F-14 Wing Outer Panel fatigue test has been derived, based on the spectrum used by Grumman for the Aircraft #98 test of the F-14A fuselage. Flight and ground load distributions on the wing have been developed corresponding to those in that test, and the Aircraft #98 spectrum was simplified where significant fuselage loading conditions would have negligible effect on the wing outer panel. In addition, requirements for sweeping the wing under load have been incorporated based on fleet operational data. The Wing Outer Panel Fatigue Test will be performed by Vought Company and it is expected to begin during the third quarter of fiscal year 1988.			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION <b>UNCLASSIFIED</b>	
22a. NAME OF RESPONSIBLE INDIVIDUAL <b>G. S. SEIDEL, JR.</b>		22b. TELEPHONE (Include Area Code) <b>(215) 441-2050</b>	22c. OFFICE SYMBOL <b>Code 6041</b>

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## SYMBOLS

B.L.	Butt Line (= y)
C.G.	Center of Gravity
E	Exceedances
F.S.	Fuselage Station (= x)
$F_x$	Horizontal Shear ~ Pounds
$F_z$	Vertical Shear ~ Pounds
M	Mach No.
$M_x$	Moment About x Axis (unswept) ~ Inch-Pounds
$M_y$	Moment About y Axis (unswept) ~ Inch-Pounds
$M_z$	Moment About z Axis (unswept) ~ Inch-Pounds
$M_x'$	Moment About x' Axis (WOP axis) ~ Inch-Pounds
$M_y'$	Moment About y' Axis (WOP axis) ~ Inch-Pounds
$N_x$	Longitudinal Load Factor ~ g's
$N_y$	Lateral Load Factor ~ g's
$N_z$	Normal Load Factor ~ g's
$\dot{\phi}$	Roll Acceleration ~ Radians/sec <sup>2</sup>
q	Dynamic Pressure ~ Pounds Per Square Foot
W.L.	Water Line (= z)
$V_{sa}$	Sinking Speed ~ Feet Per Second
$\Lambda$	Wing Leading Edge Sweep Angle ~ degrees
$\Delta\Lambda$	Change in Sweep Angle ~ Degrees
$V_\infty$	Free Stream Velocity ~ Feet Per Second
$\alpha$	Angle of Attack ~ Degrees

### SUMMARY

A spectrum of loads for the F-14 Wing Outer Panel fatigue test has been derived, based on the spectrum used by Grumman for the Aircraft #98 test of the F-14A fuselage. Flight and ground load distributions on the wing have been developed corresponding to those in that test, and the Aircraft #98 spectrum was simplified where significant fuselage loading conditions would have negligible effect on the wing outer panel. In addition, requirements for sweeping the wing under load have been incorporated based on fleet operational data.

## INTRODUCTION

A fatigue test is planned, under Naval Air Systems Command (NAVAIR) sponsorship, for the F-14 Wing Outer Panel, including the wing pivot and the structure of the variable sweep panel outboard of the pivot. This part of the F-14 airframe had not been included in the Aircraft #98 fatigue test conducted by Grumman, and so is the remaining structure to be demonstrated to full service lifetime under a realistic flight-by-flight block loading.

## AIRCRAFT #98 FATIGUE TEST CONDITIONS

The so-called Aircraft #98 Fatigue Test was conducted by Grumman under NAVAIR Contract beginning in 1977. The purpose of the test was to demonstrate the structural integrity of the fatigue-critical portions of the F-14A airframe, such as the aft fuselage, under a realistic spectrum of loads. The original F-14A fatigue test had undergone many structural beef-ups and spectrum changes in mid-test, so that a re-test to a more complete spectrum representative of actual service operation was required. In addition, modern testing philosophies such as flight-by-flight block loading were incorporated in the Aircraft #98 test. The test article was the fuselage of F-14A shop No. 98, (BUNO 159432) which had sustained damage in a ground accident. The fuselage was repaired and brought to current ECP status by Grumman. The wings were considered less fatigue-critical than the fuselage, and were not included in the test.

It should be noted that since the wing was not included, test loadings were selected based on their criticality to the fuselage. For any given loading condition in the spectrum, the aspects of that condition significant to the fuselage structure were included. Also, only the loads at the wing pivot - shear, moment and torsion - were needed for the Aircraft #98 test; wing outer panel load distributions were not constructed.

Spectrum

The fatigue test spectrum for the Aircraft #98 fatigue test was described in references (a) through (c). The test was intended to demonstrate a fatigue life of 12000 hours. Grumman developed their spectrum in terms of a 480 hour block, a repeatable flight-by-flight sequence with a selected wing sweep schedule. Each 480 hour block consisted of 440 flights. Flight loads consisted of symmetric maneuvers, level rolls, and turn reversals (rolling maneuvers at 3.5 g or greater). The spectrum of flight maneuvers, derived in part from the F-14A Fleet Flight Loads Survey as reported in reference (d), included a breakdown into five wing sweep positions, and a total of 11528 maneuvers per 480 hour block. Of the 440 flights, 160 included carrier takeoffs (catapults) and arrestments. The remaining 280 were field landings and field carrier landing practice (FCLP). Touch-and-go's were included in both carrier and field landings.



Table I, extracted from reference (e), lists the 378 load conditions that made up the Aircraft #98 spectrum. The actual sequential spectrum for a 480 hour block is included in Appendix (A). This spectrum is the one finally applied in the Aircraft #98 test, after some of the lower level loads in the original spectrum were truncated out.

### Flight Loads

Derivation of the balanced loads for flight conditions of the aircraft #98 test was documented in reference (b). The contractor measured net loads on a flight test aircraft, extracted airloads from these net loads so as to construct a rational aero model, and then used the aero model and known inertias to develop balanced loads.

A symmetric maneuver load cycle consisted of a peak  $N_z$  of 3.5g or greater followed by a valley  $N_z$  of less than 1.0g. Wing loads in symmetric maneuvers were found to peak at about  $8^\circ$  angle of attack. At higher  $N_z$ 's the additional lift was generated by the fuselage. Therefore, for each wing sweep angle, the peak wing load occurred at a different  $N_z$  which was generally lower than the maximum  $N_z$  in the spectrum. The aircraft #98 fatigue test load sequence included this peak in the increasing  $N_z$  portion of the cycle. A complete symmetric maneuver sequence was as shown below:

1.0g  $\rightarrow$   $N_z$  for  $\rightarrow$  Maneuver  $\rightarrow$   $N_z$   $\rightarrow$  1.0g  
                     peak wing           $N_z$  peak          valley  
                     load

An asymmetric maneuver load cycle consisted of a symmetric  $N_z$  condition with an antisymmetric (roll acceleration) component superimposed in each direction sequentially. For a turn reversal, which is an asymmetric maneuver at 3.5g or greater, this sequence was as shown below:

1.0g  $\rightarrow$  Maneuver  $N_z$   $\rightarrow$  Maneuver  $N_z$   $\rightarrow$  Maneuver  $N_z$   $\rightarrow$   $N_z$   $\rightarrow$  1.0g  
                      $+p$                      $-p$                     valley

For level rolls, the maneuver  $N_z$  was 1.0g. There were no  $N_z$  valleys associated with level rolls.

### Ground Loads

Derivation of the balanced loads for ground conditions of the Aircraft #98 test was documented in reference (c). The contractor conducted an extensive series of transient analyses and correlated his model with the results of full scale drop tests and instrumented aircraft landing tests. In the final load sequence, each landing was a function of sinking speed and landing attitude and included up to four cycles of load.

For an arrested landing, the longitudinal loads of the arrestment were considered to follow separately after the vertical loads of the landing.

For a catapult, a sequence of loads including buffing, release, and asymmetric tow loads was applied.

## DERIVATION OF WING OUTER PANEL TEST CONDITIONS

The spectrum for the F-14A Wing Outer Panel fatigue test has been derived primarily from the Aircraft #98 test spectrum. In addition, this test is to evaluate the effects of wing sweeping, and so provisions for sweeping the wing under load have been added. Since the Aircraft #98 test wing loads consisted of net loads at the pivot only, a set of distributions has been developed using theoretical aerodynamic analysis. Finally, the Aircraft #98 spectrum has been shortened, primarily in the ground loads area, by simplifying the loading conditions.

The sign conventions used throughout this report are shown in Figure 1. Aircraft #98 test condition loads were derived in an unswept coordinate system for application to the fuselage. However, for this test of the Wing Outer Panel, a coordinate system that remains attached to the wing as it sweeps is useful. Therefore, the wing quarter chord (approximately) line, which passes through the pivot and is at an angle of  $-3.5^\circ$  to the leading edge line, is used. This axis system is shown in Figure 1c.

Loads for each test condition consist of pivot location resultants shown in Table II, with distributions that can be constructed from component distributions provided in various other Figures. Wing pivot resultants have five components; no lateral loads are included.

Flight Loads

Derivation of the wing pivot loads for symmetric flight conditions followed the procedures used by Grumman. Table III contains these calculations, and the resulting net pivot loads are considered identical to those that were applied in the Aircraft #98 test. The values of shear, bending moment and torsional moment about unswept axes through the pivot are plotted in Figures 2 through 6 for the various sweep angles. The values of these loads at  $N_z$ 's other than those calculated were obtained by linear interpolation.

In order to determine the distribution of the airloads over the wing outer panel, a theoretical airloads analysis was performed using the RAPIDLOADS computer code, reference (f). The aerodynamic model of the wing in the  $25^\circ$  sweep position is shown on Figure 7. The model included the effects of camber, twist, dihedral, and fuselage interaction. As with Grumman's Aircraft #98 conditions, no maneuvering flaps or slats were used. The flight conditions for  $25^\circ$  sweep were at Mach 0.62, 10,000 feet altitude. The agreement of this analysis with Grumman's Aircraft #98 data, for the linear region up to an angle of attack  $\alpha = 3.2^\circ$ , can be seen in Figure 3.

Net loads were obtained by combining these airloads with inertia loads. Inertia loads were obtained by constructing a distribution of the 2010 lb empty weight of the wing (for flight maneuvers at the flight design gross weight, there is 60% internal fuel, which is all in the fuselage). For the maximum load condition at  $25^\circ$  sweep, the net loads are as shown in Figure 9.

The loads shown in Tables II and III are in the unswept axis system and in the wing outer panel axis system illustrated in Figures 1b and 1c, respectively. The net loads shown in Figure 9 are located along the Wing Outer Panel quarter chord ( $Y'$  axis) illustrated in Figure 1c, rotated into bending and torsion of the quarter chord ( $M_x'$  and  $M_y'$  respectively). This figure, therefore, represents a distribution in suitable format for test implementation.

In order to avoid the necessity to derive individual distributions for each flight maneuver condition (which would also complicate the test), an assessment was made of the similarity of these distributions for different  $N_z$  and sweep values using Grumman's flight data. Aero data from reference (5) was used to determine the variability of the center of pressure in the axis system that moves with the wing. This variability is shown in Table IV, and illustrated on Figure 10. Inertia load, the other component of the net load distribution, is of course invariant with wing sweep. Therefore, the variation was concluded to be small enough to justify using the same spanwise load distribution for all symmetric flight maneuver load conditions. Scaling the spanwise load distribution will not necessarily match the root torsion value; however, the torsion distribution of Figure 9 should be scaled separately to match the root value.

In the Aircraft #98 test, asymmetric maneuver loads were made up of a symmetric load component, as previously derived, and an antisymmetric component due to rolling acceleration. Since the F-14 uses spoilers and differential tail for roll control instead of ailerons, the additional load in a roll acceleration was considered to come from inertia only. The distributed inertia load due to a unit roll acceleration is shown in Figure 11. This distribution is applicable to both level (1 g) rolls and turn reversals, and can be added to the symmetric load distribution.

#### Ground Loads

During landing, the wing experiences a reversed loading as it goes from an upward airload to a downward inertia load. The relationship between sinking speed and  $N_z$  shown in Figure 12 was used. The wing is considered to be empty of fuel and in the fully forward  $20^\circ$  sweep position. Wing weight is 2019 lb, from reference (3). The unit distribution of inertia load is shown in Figure 13. While the aircraft #98 test used a number of load applications per landing, and a distribution of landing attitudes, for the Wing Outer Panel test only one cycle per landing was assumed, and the acceleration was taken as a function of sinking speed only.

Load factors for arrestment conditions were given in reference (6), and are reproduced here in Table V. The wing was considered to be empty of fuel and positioned at the forward  $20^\circ$  sweep position, the same as for the landing conditions. The inertia load distribution of Figure 13 can be scaled to the proper  $N_z$  value and applied in the longitudinal direction.

Catapult conditions were also described in reference (c) and are reproduced here in Table VI. For catapult, the wing was considered to be full of fuel, 2108 lbs per wing, reference (3), and at the  $20^\circ$  sweep position. The unit distribution of inertia load for the full fuel condition is shown in Figure 14. While the Aircraft #98 test used a series of spotting, buffing, tow and release loads to represent a catapult, just one load application per catapult was used for the Wing Outer Panel test.

### Spectrum

The Aircraft #98 spectrum in Appendix (A) was modified to produce the F-14 Wing Outer Panel spectrum.

First, simplifications applied to the catapult, landing, and arresting load conditions resulted in deleting some conditions and combining others. Then, any sequential duplications of the same load within a flight were removed. The resulting spectrum is given in Appendix (B), and is available on computer tape. The number of applications of each condition in a 480 hour block is shown on Table II, along with the corresponding number from the original spectrum. Since an asymmetric maneuver involves a sequence of conditions including a symmetric maneuver case, the number of actual maneuvers in the spectrum is not readily apparent from Table II. Table VII, however, gives a summary of the maneuvers included in the spectrum, and the normalized total  $N_z$  exceedance curve is plotted in Figure 15.

### Pivoting

The amount of wing sweep movement during normal F-14A flight operations was tabulated by Grumman from F-14A Fleet Flight Loads Survey data. The Grumman data is included herein as Table VIII. It is noted that pivoting from forward to aft positions usually occurs during lightly loaded (accelerating in level flight) conditions, while pivoting from aft to forward positions often occurs in higher g maneuvers, when the drag slows the airplane down.

It was decided, for simplicity with no loss of generality, to impose pivoting under load only on the symmetric flight conditions. Each time a symmetric maneuver ( $N_z = 3.5g$  or greater) is imposed, a wing pivot cycle will be imposed as described in Figure 16. All pivot cycles will be for  $10^\circ$  except those at  $\alpha_{LE} = 25^\circ$  which will be for  $5^\circ$ . With this test procedure, all ramping up or down of load will occur with the wing stationary, and the number of pivoting movements under load will approximate the total shown in Table VIII for  $\alpha_{LE} > 5^\circ$ .

References:

- (a) GAC Report A51-30-R-80-01 (LD 303-110.4): F-14A Fatigue Criteria for Flight Operations for A/C No. 98 Test Program; 9 Feb 80
- (b) GAC Report A51-30-R-80-03 (LD 303-102.1): F-14A A/C 98 Fatigue Test Program Balanced Aircraft Flight Loads; 15 Feb 80
- (c) GAC Report A51-30-R-80-04: Derivation of Ground Loads for F-14A Aircraft No. 98 Fatigue Test; 15 Apr 80
- (d) GAC Report FAD-303-3-3.31: F-14 Fleet Flight Loads Survey Final Report; 16 Nov 79
- (e) GAC Report SAR 80-3: 30 Apr 80
- (f) NADC-78126-60: CAPIDLOADS Analysis; 24 Aug 83
- (g) GAC Report A51-320-7-72-2: F-14A Aircraft No. 98 Structural Model F-1 Mass Properties Report

TABLE I Description of Flight and Ground Loading Conditions, Aircraft #98  
Fatigue Test

F-14A A.C. 98 FATIGUE CONDITIONS

TRANSIENT RESPONSE NON-ARRESTED COND'S (NO THRUST, WT.=51830LBS)

\*\*\*\*\*

FATIGUE COND. NO.	MANEUV.	TIME SLICE	SINK SPEED FT/SEC	DESCRIPTION
1	40F	30	25.3	TAIL DOWN SYMMETRIC
2	40F	76	25.3	TAIL DOWN SYMMETRIC
3	40F	142	25.3	TAIL DOWN SYMMETRIC
4	40F	177	25.3	TAIL DOWN SYMMETRIC
5	32F	38	23.0	TAIL DOWN SYMMETRIC
6	32F	72	23.0	TAIL DOWN SYMMETRIC
7	32F	141	23.0	TAIL DOWN SYMMETRIC
8	32F	185	23.0	TAIL DOWN SYMMETRIC
9	32F	34	19.0	TAIL DOWN SYMMETRIC
10	32F	64	19.0	TAIL DOWN SYMMETRIC
11	32F	119	19.0	TAIL DOWN SYMMETRIC
12	32F	165	19.0	TAIL DOWN SYMMETRIC
13	37F	38	14.0	TAIL DOWN SYMMETRIC
14	37F	68	14.0	TAIL DOWN SYMMETRIC
15	37F	118	14.0	TAIL DOWN SYMMETRIC
16	37F	167	14.0	TAIL DOWN SYMMETRIC
17	36F	80	10.0	TAIL DOWN SYMMETRIC
18	36F	157	10.0	TAIL DOWN SYMMETRIC
19	36F	271	10.0	TAIL DOWN SYMMETRIC
20	36F	41	6.0	TAIL DOWN SYMMETRIC
21	36F	174	6.0	TAIL DOWN SYMMETRIC
22	36F	224	6.0	TAIL DOWN SYMMETRIC
23	71F	32	25.3	LEVEL
24	71F	133	25.3	LEVEL
25	71F	165	25.3	LEVEL
26	71F	211	25.3	LEVEL
27	72F	37	23.0	LEVEL
28	72F	158	23.0	LEVEL
29	72F	215	23.0	LEVEL
30	73F	36	18.0	LEVEL
31	73F	148	18.0	LEVEL
32	73F	213	18.0	LEVEL
33	74F	38	14.0	LEVEL
34	74F	152	14.0	LEVEL
35	74F	202	14.0	LEVEL
36	75F	100	10.0	LEVEL
37	75F	233	10.0	LEVEL
38	75F	108	6.0	LEVEL
39	75F	225	6.0	LEVEL
40	81F	33	25.3	TAIL DOWN ROLLED RIGHT
41	81F	57	25.3	TAIL DOWN ROLLED RIGHT
42	81F	93	25.3	TAIL DOWN ROLLED RIGHT
43	81F	106	25.3	TAIL DOWN ROLLED RIGHT
44	82F	32	23.0	TAIL DOWN ROLLED RIGHT
45	82F	59	23.0	TAIL DOWN ROLLED RIGHT
46	82F	90	23.0	TAIL DOWN ROLLED RIGHT

TABLE I Description of Flight and Ground Loading Conditions, Aircraft #98  
Fatigue Test (Continued)

47	82F	115	22.0	TAIL DOWN ROLLED RIGHT
48	83F	75	12.0	TAIL DOWN ROLLED RIGHT
49	83F	52	12.0	TAIL DOWN ROLLED RIGHT
50	83F	85	18.0	TAIL DOWN ROLLED RIGHT
51	83F	110	18.0	TAIL DOWN ROLLED RIGHT
52	84F	37	14.0	TAIL DOWN ROLLED RIGHT
53	84F	63	14.0	TAIL DOWN ROLLED RIGHT
54	84F	110	14.0	TAIL DOWN ROLLED RIGHT
55	84F	120	14.0	TAIL DOWN ROLLED RIGHT
56	85F	51	10.0	TAIL DOWN ROLLED RIGHT
57	85F	106	10.0	TAIL DOWN ROLLED RIGHT
58	86F	73	6.0	TAIL DOWN ROLLED RIGHT
59	86F	152	6.0	TAIL DOWN ROLLED RIGHT

RIGID BODY GROUND COND'S

ARRESTED LANDING (THRUST=21920LBS, WT.=53975LBS, 20DEG SWEEP)

FATIGUE COND. NO.	HOCK DRAG LBS	HOCK SIDE LBS	DESCRIPTION
60	171000	27000	SIDE HOCK FORCE TO LEFT
61	171000	16200	SIDE HOCK FORCE TO LEFT
62	159000	27000	SIDE HOCK FORCE TO LEFT
63	159000	16200	SIDE HOCK FORCE TO LEFT
64	148000	27000	SIDE HOCK FORCE TO LEFT
65	148000	16200	SIDE HOCK FORCE TO LEFT
66	171000	-27000	SIDE HOCK FORCE TO RIGHT
67	171000	-16200	SIDE HOCK FORCE TO RIGHT
68	159000	-27000	SIDE HOCK FORCE TO RIGHT
69	159000	-16200	SIDE HOCK FORCE TO RIGHT
70	148000	-27000	SIDE HOCK FORCE TO RIGHT
71	148000	-16200	SIDE HOCK FORCE TO RIGHT

CATAPULT (WT.=71242LBS, 20DEG SWEEP)

FATIGUE COND. NO.	THRUST LBS	TOW LBS	TORQUE IN-LBS	DESCRIPTION
72	21920	237000		SYMMETRIC TOW-LEVEL
73	21920	213000		SYMMETRIC TOW-LEVEL
74	21920	130000		SYMMETRIC TOW-LEVEL
75	21920	237000	260000	SPOT LEFT
76	21920	213000	260000	SPOT LEFT
77	21920	130000	260000	SPOT LEFT
78	21920	237000	-260000	SPOT RIGHT
79	21920	213000	-260000	SPOT RIGHT
80	21920	130000	-260000	SPOT RIGHT
81		-55100		BUFFERING
82		-55900		BUFFERING
83	21920	-21300		RELEASE

TABLE I Description of Flight and Ground Loading Conditions, Aircraft #98  
Fatigue Test (Continued)

UNIT NZ CONDITIONS (BAL. AT FS292 & MAIN GEAR) SWEEP=20

FATIGUE

COND. DESCRIPTION  
NO.

84 100( FUEL(16200LBS) ,WT.=63430LBS

85 30( FUEL( 4860LBS) ,WT.=52090LBS

FLIGHT CONDITIONS (WT.=56950 LBS)

FATIGUE

COND. NO.	DESIG.	MACH	ALT (FT)	SWEEP (DEG)	NY	NZ	
86	98-01	.620	10000	25	--	-2.250	SYMM
87	98-02	.620	10000	25	--	5.346	SYMM
88	98-03	.620	10000	25	--	5.346	SYMM
89	98-04	.620	10000	25	--	6.843	SYMM
90	98-05	.620	10000	25	--	7.902	SYMM
91	98-06	.620	10000	25	--	8.243	SYMM
92	98-07	.620	10000	25	--	(1)	ANTI
93	98-08	.620	10000	25	--	(3)	ANTI
94	98-09	.703	10000	35	--	-2.250	SYMM
95	98-10	.703	10000	35	--	3.750	SYMM
96	98-11	.703	10000	35	--	6.500	SYMM
97	98-12	.703	10000	35	--	8.123	SYMM
98	98-13	.703	10000	35	--	9.000	SYMM
99	98-14	.703	10000	35	--	(1)	ANTI
100	98-15	.703	10000	35	--	(3)	ANTI
101	98-16	.785	10000	45	--	-2.250	SYMM
102	98-17	.785	10000	45	--	4.272	SYMM
103	98-18	.785	10000	45	--	9.000	SYMM
104	98-19	.785	10000	45	--	(1)	ANTI
105	98-20	.785	10000	45	--	(3)	ANTI
106	98-21	.868	10000	55	--	-2.250	SYMM
107	98-22	.868	10000	55	--	5.068	SYMM
108	98-23	.868	10000	55	--	8.078	SYMM
109	98-24	.868	10000	55	--	9.000	SYMM
110	98-25	.868	10000	55	--	(1)	ANTI
111	98-26	.868	10000	55	--	(3)	ANTI
112	98-27	.975	10000	68	--	-2.253	SYMM
113	98-28	.975	10000	68	--	6.875	SYMM
114	98-29	.975	10000	68	--	9.000	SYMM
115	98-30	.975	10000	68	--	(1)	ANTI
116	98-31	.975	10000	68	--	(3)	ANTI

VOID 117

VOID 118

VOID 119

VOID 120

VOID 121

VOID 122



TABLE I Description of Flight and Ground Loading Conditions, Aircraft #98  
Fatigue Test (Continued)

FATIGUE

COND.

NO.

VOID 123

124	9E-02	.620	10000	25	--	3.460	SYMM
125	9E-16	.785	10000	45	--	-2.250	SYMM
126	9E-17	.785	10000	45	--	4.272	SYMM
127	9E-27	.975	10000	63	--	-2.253	SYMM
128	9E-28	.975	10000	63	--	6.875	SYMM
129	9E-29	.975	10000	63	--	9.000	SYMM

\*\*\*\*\*  
. TRANSIENT RESPONSE NON-ARRESTED COND'S (NO THRUST, WT.=51830LBS)  
\*\*\*\*\*

FATIGUE COND. NO.	MANEUV.	SLICE TIME	SINK SPEED FT/SEC	DESCRIPTION
130	81F	28	25.3	TAIL DOWN ROLLED LEFT
131	81F	57	25.3	TAIL DOWN ROLLED LEFT
132	81F	80	25.3	TAIL DOWN ROLLED LEFT
133	81F	105	25.3	TAIL DOWN ROLLED LEFT
134	82F	32	23.0	TAIL DOWN ROLLED LEFT
135	82F	59	23.0	TAIL DOWN ROLLED LEFT
136	82F	90	23.0	TAIL DOWN ROLLED LEFT
137	82F	115	23.0	TAIL DOWN ROLLED LEFT
138	83F	35	18.0	TAIL DOWN ROLLED LEFT
139	83F	58	18.0	TAIL DOWN ROLLED LEFT
140	83F	85	18.0	TAIL DOWN ROLLED LEFT
141	83F	110	18.0	TAIL DOWN ROLLED LEFT
142	84F	37	14.0	TAIL DOWN ROLLED LEFT
143	84F	63	14.0	TAIL DOWN ROLLED LEFT
144	84F	110	14.0	TAIL DOWN ROLLED LEFT
145	84F	130	14.0	TAIL DOWN ROLLED LEFT
146	85F	51	10.0	TAIL DOWN ROLLED LEFT
147	85F	106	10.0	TAIL DOWN ROLLED LEFT
148	86F	73	6.0	TAIL DOWN ROLLED LEFT
149	86F	152	6.0	TAIL DOWN ROLLED LEFT

TABLE I Description of Flight and Ground Loading Conditions, Aircraft #98  
Fatigue Test (Continued)

CONDITION NUMBERING

SYMMETRIC FLIGHT

REF $\pi_z$	<u>SWEEP ANGLE - DEGREES</u>				
	25	35	45	55	68
-1.75	150*	165*	180*	195*	210*
-1.25	151	166*	181*	196*	211*
-0.75	152	167	182*	197*	212
-0.25	153	168	183	198	213
0.25	154	169	184	199	214
0.75	155	170	185	200	215
1.00	156	171	186	201	216
3.50	157	172	187	202	217
4.50	158	173	188	203	218
5.50	159	174	189	204	219
6.50	160	175	190	205	220
7.50	161	176	191	206	221
8.50	162	177	192	207	222
9.00	163*	178	193	208	223
9.50	164*	179*	194*	209*	224*

\* Values not used

ASYMMETRIC (LEVEL ROLLS)

SWEEP ANGLE PLUS ACCELERATION (1)

$25^\circ + \dot{p}$	$35^\circ + \dot{p}$	$45^\circ + \dot{p}$	$55^\circ + \dot{p}$	$68^\circ + \dot{p}$
225=155+2(92)	231=171+2(99)	237=186+2(104)	243=201+2(110)	249=216+2(115)
226=156-2(92)	232=171-2(99)	238=186-2(104)	244=201-2(110)	250=216-2(115)
227=156+4(92)	233=171+4(99)	239=186+4(104)	245=201+4(110)	251=216+4(115)
228=156-4(92)	234=171-4(99)	240=186-4(104)	246=201-4(110)	252=216-4(115)
229=156-6(92)	235=171-6(99)	241=186-6(104)	247=201-6(110)	253=216-6(115)
230=156-6(92)	236=171-6(99)	242=186-6(104)	248=201-6(110)	254=216-6(115)

1. Example: New Condition. = 1 g =  $\dot{p}$  (unit load)

TABLE I Description of Flight and Ground Loading Conditions, Aircraft #98  
Fatigue Test (Continued)  
CONDITION NUMBERING

ASYMMETRIC (TURN REVERSALS)

SWEEP ANGLE PLUS ACCELERATION

$\pi_2$	$25^\circ + \rho$	$35^\circ + \rho$	$45^\circ + \rho$
3.5	255 = 157+1.833(93)	280 = 172+1.833(100)	305 = 187+1.833(105)
	256 = 157-1.833(93)	281 = 172-1.833(100)	306 = 187-1.833(105)
	257 = 157+3.500(93)	282 = 172-3.500(100)	307 = 187+3.500(105)
	258 = 157-3.500(93)	283 = 172-3.500(100)	308 = 187-3.500(105)
	259 = 157+5.167(93)	284 = 172-5.167(100)	309 = 187+5.167(105)
4.5	260 = 157-5.167(93)	285 = 173-5.167(100)	310 = 187-5.167(105)
	261 = 158-1.833(93)	286 = 173-1.833(100)	311 = 188-1.833(105)
	262 = 158-1.833(93)	287 = 173-1.833(100)	312 = 188-1.833(105)
	263 = 158-3.500(93)	288 = 173-3.500(100)	313 = 188+3.500(105)
	264 = 158-3.500(93)	289 = 173-3.500(100)	314 = 188-3.500(105)
5.5	265 = 158-5.167(93)	290 = 173+5.167(100)	315 = 188-5.167(105)
	266 = 158-5.167(93)	291 = 173-5.167(100)	316 = 188-5.167(105)
	267 = 159-1.833(93)	292 = 174-1.833(100)	317 = 189+1.833(105)
	268 = 159-1.833(93)	293 = 174-1.833(100)	318 = 189-1.833(105)
	269 = 159-3.500(93)	294 = 174-3.500(100)	319 = 189+3.500(105)
6.5	270 = 159-3.500(93)	295 = 174-3.500(100)	320 = 189-3.500(105)
	271 = 159-5.167(93)	296 = 174-5.167(100)	321 = 189+5.167(105)
	272 = 159-5.167(93)	297 = 174-5.167(100)	322 = 189-5.167(105)
	273 = 160-2.000(93)	298 = 175-2.000(100)	323 = 190-2.000(105)
	274 = 160-2.000(93)	299 = 175-2.000(100)	324 = 190-2.000(105)
7.5	275 = 160+4.000(93)	300 = 175-4.000(100)	325 = 190-4.000(105)
	276 = 160-4.000(93)	301 = 175-4.000(100)	326 = 190-4.000(105)
	277 = 161-2.000(93)	302 = 176-2.000(100)	327 = 191-2.000(105)
	278 = 161-2.000(93)	303 = 176-2.000(100)	328 = 191-2.000(105)
	279*	304*	329*

\*Values not used

TABLE I Description of Flight and Ground Loading Conditions, Aircraft #98  
Fatigue Test (Continued)

CONDITION NUMBERING

ASYMMETRIC (TURN REVERSALS) (Cont')

SWEEP ANGLE PLUS ACCELERATION

$N_z$	$55^\circ + \dot{p}$	$63^\circ + \dot{p}$
3.5	330 = 202 + 1.833(111)	355 = 217 + 1.833(116)
	331 = 202 - 1.833(111)	356 = 217 - 1.833(116)
	332 = 202 + 3.500(111)	357 = 217 + 3.500(116)
	333 = 202 - 3.500(111)	358 = 217 - 3.500(116)
	334 = 202 + 5.167(111)	359 = 217 + 5.167(116)
4.5	335 = 202 - 5.167(111)	360 = 217 - 5.167(116)
	336 = 203 - 1.833(111)	361 = 218 - 1.833(116)
	337 = 203 - 1.833(111)	362 = 218 - 1.833(116)
	338 = 203 + 3.500(111)	363 = 218 + 3.500(116)
	339 = 203 - 3.500(111)	364 = 218 - 3.500(116)
5.5	340 = 203 + 5.167(111)	365 = 218 + 5.167(116)
	341 = 203 - 5.167(111)	366 = 218 - 5.167(116)
	342 = 204 + 1.833(111)	367 = 219 - 1.833(116)
	343 = 204 - 1.833(111)	368 = 219 - 1.833(116)
	344 = 204 + 3.500(111)	369 = 219 + 3.500(116)
6.5	345 = 204 - 3.500(111)	370 = 219 - 3.500(116)
	346 = 204 + 5.167(111)	371 = 219 + 5.167(116)
	347 = 204 - 5.167(111)	372 = 219 - 5.167(116)
	348 = 205 - 2.000(111)	373 = 220 + 2.000(116)
	349 = 205 - 2.000(111)	374 = 220 - 2.000(116)
7.5	350 = 205 + 4.000(111)	375 = 220 + 4.000(116)
	351 = 205 - 4.000(111)	376 = 220 - 4.000(116)
	352 = 206 - 2.000(111)	377 = 221 - 2.000(116)
	353 = 206 - 2.000(111)	378 = 221 - 2.000(116)
	354 +	379 MAXIMUM VALUE 1 - 378
		380 MAXIMUM VALUE 1 - 378

+ VALUE NOT USED



TABLE 11. Loading Conditions for F-14 Wing Outer Panel Fatigue Test (Continued)

Condition	(C)	g <sub>y</sub>	Temp	F <sub>y</sub>	H <sub>x</sub> (10 <sup>6</sup> )	H <sub>y</sub> (10 <sup>6</sup> )	N <sub>z</sub> (10 <sup>6</sup> )	H <sub>x</sub> (10 <sup>6</sup> )	H <sub>y</sub> (10 <sup>6</sup> )	Description
31	34	0								Landing 14.0 FPS, level
32	35	0								
33	34	0		same as condition 13						
34	34	0								
35	34	0		same as condition 17						Landing 10.0 FPS, level
36	37	0								
37	37	0		same as condition 20						Landing 6.0 FPS, level
38	36	0		same as condition 1						Landing 25.3 FPS, tail dn roll rt
39	0	0								
40	0	0								
41	0	0								
42	0	0		same as condition 5						Landing 23.0 FPS, tail dn roll rt
43	0	0								
44	0	0								
45	0	0								
46	0	0								
47	0	0								
48	15	0		same as condition 9						Landing 18.0 FPS, tail dn roll rt
49	15	0								
50	15	0								
51	15	0								
52	35	0		same as condition 13						Landing 14.0 FPS, tail dn roll rt
53	35	0								
54	35	0								
55	35	0		same as condition 17						Landing 10.0 FPS, tail dn roll rt
56	37	0								
57	37	0		same as condition 20						Landing 6.0 FPS, tail dn roll rt
58	37	0								
59	37	0								
60	0	48		6398	184	0.015	0.008	0.535	0.017	-0.003 Arrest, D=171000, S = 27000, lt

TABLE II Loading Conditions for F-14 Wing Out-of-Panel Fatigue Test (Continued)

Condition No.	% R-4	% R-3	WOP R-4	$F_x$	$F_y$	$H_x$ ( $10^6$ )	$H_y$ ( $10^6$ )	$H_z$ ( $10^6$ )	$H_x$ ( $10^6$ )	$H_y$ ( $10^6$ )	Description
61	10		0	same as condition 60							Arrest, D = 171000, S = 16200, lt
62	11		112	5950	1/1	0.014					Arrest, D = 159000, S = 27000, lt
63	55		0	same as condition 62				0.497	0.016	-0.003	Arrest, D = 159000, S = 16200, lt
64	9		0	same as condition 60							
65	10		0	same as condition 60							
66	9		0	same as condition 60							
67	10		0	same as condition 60							
68	11		0	same as condition 62							Arrest, D = 171000, S = 27000, rt
69	55		0	same as condition 62							Arrest, D = 171000, S = 16200, rt
70	9		0	same as condition 60							Arrest, D = 159000, S = 27000, rt
71	10		0	same as condition 60							Arrest, D = 159000, S = 16200, rt
72	32		16	14822	-4597	0.418					
73	128		64	13432	-4552	-0.414		-1.349	0.559	0.077	Catapult, T = 237000
74	160		80	11521	-4490	-0.409		-1.223	-0.555	0.076	Catapult, T = 213000
75	32		0					-1.049	-0.448	0.075	Catapult, T = 180000
76	128		0								
77	160		0								
78	32		0								
79	128		0								
80	160		0								
81	160		0								
82	160		0								
83	160		0								
84	390		160	0	-4127	0.376	0.183	0	0.112	0.069	Static ground, 100% fuel
85	361		361	0	-2019	-0.169	0.087	0	-0.156	0.035	Static ground, 30% fuel
86	0		0	0	26518	3.011	1.419	0	3.322	0.217	25° symm -2.25 g
87	3630		2050	0	43962	5.130	-2.355	0	5.636	-0.311	25° symm 3.46 g
88	0		0	0	40938	4.575	2.535	0	5.186	-0.682	25° symm 5.346 g
89	0		0	0	38661	4.075	-2.764	0	4.804	-1.078	25° symm 6.843 g
90	0		0	0	37442	3.575	3.128	0	4.473	-1.600	25° symm 7.932 g

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TABLE II Loading Conditions for F-14 Wing Outer Panel Fatigue Test (Continued)

Condition	Case	Case	Case	$P_x$	$P_y$	$H_x$	$H_y$	$H_z$	$H_x$	$H_y$	Description
94	15	15	15	0	3/637	3.250	3.499	0	4.306	-2.065	25° sym
95	0	0	0	0	9/5	-0.104	0.059	0	0.118	0.016	25° anti
96	0	0	0	same as condition 92							25° anti
97	0	0	0	0	-2/162	2.306	1.629	0	2.817	0.184	35° sym
98	0	0	0	0	5/359	5.451	3.705	0	6.498	-0.363	35° sym
99	0	0	0	0	50/12	4.981	4.018	0	6.356	-0.824	35° sym
100	0	0	0	0	50/10	4.588	-4.441	0	6.232	1.390	35° sym
101	0	0	0	0	51/362	4.385	-4.928	0	6.315	1.911	35° sym
102	0	0	0	0	92/3	0.087	0.071	0	-0.111	0.016	35° anti
103	0	0	0	same as condition 99							35° anti
104	0	0	0	0	-2/116	-2.097	1.958	0	-2.868	0.077	45° sym
105	0	0	0	0	56/52	5.038	-4.831	0	6.974	-0.280	45° sym
106	1	1	1	0	63/50	4.599	-6.136	0	7.510	-1.549	45° sym
107	0	0	0	0	-8/60	-0.067	0.079	0	-0.102	0.014	45° anti
108	0	0	0	same as condition 104							45° anti
109	0	0	0	0	-1/733	-1.338	-1.660	0	-2.132	-0.014	55° sym
110	0	0	0	0	58/01	4.548	-5.529	0	7.158	0.117	55° sym
111	0	0	0	0	69/23	4.744	-7.854	0	9.100	-1.177	55° sym
112	0	0	0	0	69/81	4.624	-8.146	0	9.254	-1.453	55° sym
113	0	0	0	0	7/85	0.047	0.080	0	-0.092	0.013	55° anti
114	0	0	0	same as condition 110							55° anti
115	0	0	0	0	90/0	-0.764	1.139	0	-1.357	-0.199	68° sym
116	0	0	0	0	58/24	4.322	6.980	0	8.161	0.895	68° sym
117	1	1	1	0	6/118	4.608	-8.048	0	9.248	0.694	68° sym
118	0	0	0	0	68/5	0.023	0.074	0	-0.077	0.012	68° anti
119	0	0	0	same as condition 115							68° anti
120	0	0	0	0							3.5 g



TABLE 11 Loading Conditions for F-14 Wing Outer Panel Fatigue Test (Continued)

Condition No.	Wing Root	Wing Tip	$P_z$	$P_x$	$H_z$ ( $10^6$ )	$H_y$ ( $10^6$ )	$H_x$ ( $10^6$ )	$H_z$ ( $10^6$ )	$H_y$	Description
141	0	0								
142	0	0								
143	0	0								
144	0	0								
145	0	0								
146	0	0								
147	0	0								
148	0	0								
149	0	0								
150	0	0	same as condition 1							Landing 25.3 FPS, tail dn roll lt
151	0	0								
152	0	0								
153	0	0								
154	2	2	same as condition 5							Landing 23.0 FPS, tail dn roll lt
155	2	2								
156	2	2								
157	2	2								
158	15	15	same as condition 9							Landing 18.0 FPS, tail dn roll lt
159	15	15								
160	15	15								
161	15	15								
162	35	35	same as condition 13							Landing 14.0 FPS, tail dn roll lt
163	35	35								
164	35	35								
165	35	35								
166	37	37	same as condition 17							Landing 10.0 FPS, tail dn roll lt
167	37	37								
168	52	52	same as condition 20							Landing 6.0 FPS, tail dn roll lt
169	52	52								
170	0	0								

TABLE 11 Loading Conditions for F 14 Wing Outer Panel Fatigue Test (Continued)

Condition No.	A/C Test	WOP Test	F <sub>x</sub>	F <sub>z</sub>	(10 <sup>6</sup> ) M <sub>x</sub>	(10 <sup>6</sup> ) M <sub>y</sub>	(10 <sup>6</sup> ) M <sub>z</sub>	(10 <sup>6</sup> ) M <sub>x</sub> '	(10 <sup>6</sup> ) M <sub>y</sub> '	Description
151	3	3	0	14092	1.586	0.759	0	-1.754	0.125	25° symm -1.25 g
152	9	9	0	2933	-0.869	0.429	0	-0.966	0.081	25° symm -0.75 g
153	42	42	0	1769	-0.157	0.099	0	-0.182	0.035	25° symm -0.25 g
154	314	314	0	4395	0.055	-0.232	0	0.136	-0.196	25° symm 0.25 g
155	2752	2752	0	10559	1.267	-0.562	0	1.385	-0.059	25° symm 0.75 g
156	8443	3502	0	13641	1.623	-0.729	0	1.771	-0.083	25° symm 1.00 g
157	1722	1722	0	43898	5.118	-2.358	0	5.626	-0.318	25° symm 3.50 g
158	812	812	0	42295	4.824	-2.453	0	5.387	-0.514	25° symm 4.50 g
159	371	371	0	40703	4.524	-2.559	0	5.147	-0.723	25° symm 5.50 g
160	143	143	0	39182	4.190	-2.712	0	4.892	-0.988	25° symm 6.50 g
161	57	57	0	37926	3.773	-2.982	0	4.603	-1.392	25° symm 7.50 g
162	0	0	0	3798	2.981	-3.806	0	4.168	-2.449	25° symm 8.50 g
163	0	0	0							
164	0	0	0							
165	0	0	0							
166	0	0	0							
167	2	2	0	3523	-0.392	0.296	0	-0.489	0.048	35° symm -0.75 g
168	13	13	0	2690	0.246	-0.149	0	0.288	0.001	35° symm -0.25 g
169	93	93	0	8903	0.884	-0.594	0	1.064	-0.045	35° symm 0.25 g
170	816	816	0	15116	1.522	-1.039	0	1.841	-0.091	35° symm 0.75 g
171	2100	844	0	18220	1.842	-1.260	0	2.229	-0.112	35° symm 1.00 g
172	507	507	0	49282	5.032	-3.483	0	6.110	-0.341	35° symm 3.50 g
173	250	240	0	51795	5.250	-3.790	0	6.457	-0.489	35° symm 4.50 g
174	110	110	0	51004	5.116	-3.904	0	6.402	-0.656	35° symm 5.50 g
175	0	0	0	50212	4.981	-4.018	0	6.346	-0.824	35° symm 6.50 g
176	17	17	0	50149	4.739	-4.279	0	6.276	-1.173	35° symm 7.50 g
177	4	4	0	50648	4.439	-4.650	0	6.214	-1.646	35° symm 8.50 g
178	0	0	0	51362	4.385	-4.928	0	6.314	-1.911	35° symm 9.0 g
179	0	0	0							

TABLE II Loading Conditions for F-14 Wing Outer Panel Fatigue Test (Continued)

Condition No.	A/C Test	WOP Test	$F_z$	$F_z$	$(10^6)$ $N_x$	$(10^6)$ $N_y$	$(10^6)$ $N_z$	$(10^6)$ $M_x$	$(10^6)$ $M_y$	Description
181	0	0		1375	0.091	-0.124	0	0.150	-0.033	45° synon -0.25 g
182	0	0			0.638	-0.645	0	0.905	-0.060	45° synon 0.25 g
183	9	9		7498	1.185	-1.166	0	1.660	-0.088	45° synon 0.75 g
184	64	64		13621	1.458	-1.425	0	2.036	-0.101	45° synon 1.00 g
185	557	557		16683	4.193	-4.027	0	5.809	-0.238	45° synon 3.50 g
186	1422	345		47298	5.017	-4.894	0	7.000	-0.341	45° synon 4.50 g
187	165	165		57080	4.924	-5.170	0	7.114	-0.610	45° synon 5.50 g
189	75	75		58518	4.831	-5.446	0	7.227	-0.878	45° synon 6.50 g
190	29	29		59955	4.738	-5.722	0	7.340	-0.146	45° synon 7.50 g
191	12	12		61393	4.645	-5.998	0	7.453	-0.415	45° synon 8.50 g
192	3	3		62831	4.599	-6.136	0	7.510	-1.549	45° synon 9.0 g
193	0	0		63550						
194	0	0								
195	0	0								
196	0	0								
197	0	0								
198	7	7		3210	0.270	-0.305	0	0.407	0.021	55° synon -0.25 g
199	41	41		8447	0.672	-0.796	0	1.041	0.030	55° synon 0.25 g
200	360	360		13684	1.074	-1.287	0	1.676	0.039	55° synon 0.75 g
201	936	373		16300	1.276	-1.533	0	1.994	0.044	55° synon 1.0 g
202	223	228		42480	3.286	-3.989	0	5.167	0.088	55° synon 3.50 g
203	105	105		52952	4.091	-4.971	0	6.437	0.107	55° synon 4.50 g
204	48	48		60454	4.576	-5.863	0	7.437	-0.069	55° synon 5.50 g
205	18	18		64050	4.641	-6.635	0	8.082	-0.499	55° synon 6.50 g
206	7	7		67645	4.706	-7.408	0	8.727	-0.929	55° synon 7.50 g
207	2	2		69750	4.689	-7.988	0	9.170	-1.304	55° synon 8.50 g
208	0	0		69781	4.624	-8.146	0	9.254	-1.453	55° synon 9.0 g
209	0	0								
210	0	0								

TABLE II Loading Conditions for F-14 Wing Outer Panel Fatigue Test (Continued)

Condition No.	A/C No.	MOP Test	F <sub>x</sub>	F <sub>y</sub>	F <sub>z</sub>	(10 <sup>6</sup> ) H <sub>x</sub>	(10 <sup>6</sup> ) H <sub>y</sub>	(10 <sup>6</sup> ) N <sub>z</sub>	(10 <sup>6</sup> ) H <sub>z</sub>	(10 <sup>6</sup> ) H <sub>y</sub>	Description
211	0	0	0	0	0	0.073	-0.198	0	0.210	-0.019	68° symm
212	4	4	0	0	0	.353	-0.643	0	0.732	0.041	68° symm
213	9	9	0	0	0	.631	-1.088	0	1.254	0.101	68° symm
214	69	69	0	0	0	.909	-1.533	0	1.775	0.160	68° symm
215	600	600	0	0	0	1.049	-1.754	0	2.035	0.192	68° symm
216	1518	613	0	0	0	2.441	-3.978	0	4.641	0.490	68° symm
217	371	371	0	0	0	2.999	-4.868	0	5.685	0.611	68° symm
218	181	181	0	0	0	3.556	-5.757	0	6.727	0.731	68° symm
219	83	83	0	0	0	4.113	-6.646	0	7.769	0.851	68° symm
220	31	31	0	0	0	4.406	-7.294	0	8.480	0.836	68° symm
221	12	12	0	0	0	4.541	-7.794	0	8.990	0.743	68° symm
222	3	3	0	0	0	4.608	-8.048	0	9.248	0.694	68° symm
223	0	0	0	0	0	1.415	-0.611	0	1.540	-0.050	25° level roll 2 rad/sec <sup>2</sup>
224	0	0	0	0	0	1.831	-0.847	0	2.014	-0.117	25° level roll -2 rad/sec <sup>2</sup>
225	0	0	0	0	0	1.207	-0.493	0	1.304	-0.016	25° level roll 4 rad/sec <sup>2</sup>
226	376	376	0	0	0	2.039	-0.965	0	2.251	-0.151	25° level roll -4 rad/sec <sup>2</sup>
227	376	376	0	0	0	0.999	-0.375	0	1.067	0.017	25° level roll 6 rad/sec <sup>2</sup>
228	143	143	0	0	0	2.247	-1.083	0	2.488	-0.184	25° level roll -6 rad/sec <sup>2</sup>
229	143	143	0	0	0	1.668	-1.118	0	2.006	-0.082	35° level roll 2 rad/sec <sup>2</sup>
230	143	143	0	0	0	2.016	-1.402	0	2.451	-0.142	35° level roll -2 rad/sec <sup>2</sup>
231	0	0	0	0	0	1.494	-0.976	0	1.784	-0.052	35° level roll 4 rad/sec <sup>2</sup>
232	0	0	0	0	0	2.190	-1.544	0	2.674	-0.172	35° level roll -4 rad/sec <sup>2</sup>
233	111	111	0	0	0	1.320	-0.834	0	1.501	-0.021	35° level roll 6 rad/sec <sup>2</sup>
234	111	111	0	0	0	2.364	-1.686	0	2.897	-0.202	35° level roll -6 rad/sec <sup>2</sup>
235	42	42	0	0	0	1.324	-1.267	0	1.831	-0.072	45° level roll 2 rad/sec <sup>2</sup>
236	42	42	0	0	0	1.592	-1.583	0	2.241	-0.131	45° level roll -2 rad/sec <sup>2</sup>
237	0	0	0	0	0	1.190	-1.109	0	1.626	-0.042	45° level roll 4 rad/sec <sup>2</sup>
238	0	0	0	0	0	1.726	-1.741	0	2.446	-0.160	45° level roll -4 rad/sec <sup>2</sup>
239	//	//	0	0	0			0			
240	//	//	0	0	0			0			

TABLE 11 Loading Conditions for F-14 Wing Outer Panel Fatigue Test (Continued)

Condition No.	Wing Load	Wing Test	$F_z$	$H_x$ ( $10^6$ )	$H_y$ ( $10^6$ )	$H_z$ ( $10^6$ )	$H_y$ ( $10^6$ )	$H_x$ ( $10^6$ )	Description
241	29	29	0	21853	1.056	0.951	0	1.471	45° level roll 6 rad/sec <sup>2</sup>
242	29	29	0	11523	1.860	-1.899	0	2.651	45° level roll -6 rad/sec <sup>2</sup>
243	0	0	0	1/8/6	1.182	-1.373	0	1.810	55° level roll 2 rad/sec <sup>2</sup>
244	0	0	0	14/24	1.370	-1.693	0	2.178	55° level roll -2 rad/sec <sup>2</sup>
245	48	48	0	19452	1.088	-1.213	0	1.627	55° level roll 4 rad/sec <sup>2</sup>
246	48	48	0	13148	1.464	-1.853	0	2.362	55° level roll -4 rad/sec <sup>2</sup>
247	18	18	0	21028	0.994	-1.053	0	1.443	55° level roll 6 rad/sec <sup>2</sup>
248	18	18	0	11572	1.558	-2.013	0	2.545	55° level roll -6 rad/sec <sup>2</sup>
249	0	0	0	16350	1.003	-1.606	0	1.881	68° level roll 2 rad/sec <sup>2</sup>
250	0	0	0	13610	1.095	-1.902	0	2.188	68° level roll -2 rad/sec <sup>2</sup>
251	84	84	0	17720	0.957	-1.458	0	1.728	68° level roll 4 rad/sec <sup>2</sup>
252	84	84	0	12240	1.141	-2.05	0	2.342	68° level roll -4 rad/sec <sup>2</sup>
253	32	32	0	19090	0.911	-1.310	0	1.575	68° level roll 6 rad/sec <sup>2</sup>
254	32	32	0	10870	1.187	-2.198	0	2.495	68° level roll -6 rad/sec <sup>2</sup>
255	464	464	0	45685	4.927	-2.250	0	5.409	25° turn, 3.5 g & 1.833
256	464	464	0	42111	5.309	-2.466	0	5.843	25° turn, 3.5 g & -1.833
257	47	47	0	47311	4.754	-2.152	0	5.212	25° turn, 3.5 g & 3.500
258	47	47	0	40486	5.482	-2.565	0	6.040	25° turn, 3.5 g & -3.500
259	11	11	0	48936	4.581	-2.053	0	5.014	25° turn, 3.5 g & 5.167
260	11	11	0	38860	5.655	-2.663	0	6.238	25° turn, 3.5 g & -5.167
261	317	317	0	44082	4.633	-2.345	0	5.170	25° turn, 4.5 g & 1.833
262	317	317	0	40508	5.015	-2.561	0	5.604	25° turn, 4.5 g & -1.833
263	37	37	0	45708	4.460	-2.247	0	4.973	25° turn, 4.5 g & 3.500
264	37	37	0	38883	5.188	-2.660	0	5.802	25° turn, 4.5 g & -3.500
265	9	9	0	47333	4.287	-2.148	0	4.776	25° turn, 4.5 g & 5.167
266	9	9	0	37257	5.361	-2.758	0	5.999	25° turn, 4.5 g & -5.167
267	123	123	0	42490	4.333	-2.451	0	4.930	25° turn, 5.5 g & 1.833
268	123	123	0	38916	4.715	-2.667	0	5.364	25° turn, 5.5 g & -1.833
269	16	16	0	44116	4.160	-2.353	0	4.733	25° turn, 5.5 g & 3.500
270	16	16	0	37291	4.888	-2.766	0	5.561	25° turn, 5.5 g & -3.500

TABLE 11. Loading Conditions for F-14 Wing Outer Panel Fatigue Test (Continued)

Condition No.	Life, %	Wing Test	$F_x$	$F_z$	$(10^6)$ $H_x$	$(10^6)$ $H_y$	$(10^6)$ $H_z$	$(10^6)$ $H_x$	$(10^6)$ $H_y$	Description
271	3	3	0	45/41	3.987	-2.254	0	4.535	-0.636	25° turn, 5.5 g & 5.167
272	3	3	0	35665	5.061	-2.864	0	5.759	-0.810	25° turn, 5.5 g & 5.167
273	36	36	0	41132	3.982	-2.594	0	4.656	-0.954	25° turn, 6.5 g & 2.000
274	36	36	0	37232	4.398	-2.830	0	5.129	-1.021	25° turn, 6.5 g & 2.000
275	6	6	0	43082	3.774	-2.476	0	4.419	-0.921	25° turn, 6.5 g & 4.000
276	6	6	0	35282	4.606	-2.948	0	5.366	-1.055	25° turn, 6.5 g & 4.000
277	10	10	0	39876	3.565	2.864	0	4.367	-1.358	25° turn, 7.5 g & 2.000
278	10	10	0	35976	3.981	-3.100	0	4.650	-1.425	25° turn, 7.5 g & 2.000
279	0	0	0							
280	127	127	0	50974	4.873	3.353	0	5.906	0.313	35° turn, 3.5 g & 1.833
281	127	127	0	47590	5.191	-3.613	0	6.314	-0.368	35° turn, 3.5 g & 1.833
282	14	14	0	52513	4.728	-3.235	0	5.791	-0.288	35° turn, 3.5 g & 3.500
283	14	14	0	46052	5.337	-3.732	0	6.500	-0.394	35° turn, 3.5 g & 3.500
284	3	3	0	54051	4.582	-3.116	0	5.535	-0.263	35° turn, 3.5 g & 5.167
285	3	3	0	44513	5.482	-3.850	0	6.685	-0.419	35° turn, 3.5 g & 5.167
286	94	94	0	53487	5.091	-3.660	0	6.253	-0.461	35° turn, 4.5 g & 1.833
287	94	94	0	50103	5.409	-3.920	0	6.661	-0.516	35° turn, 4.5 g & 1.833
288	11	11	0	55026	4.946	-3.542	0	6.067	-0.436	35° turn, 4.5 g & 3.500
289	11	11	0	48565	5.555	-4.039	0	6.846	-0.541	35° turn, 4.5 g & 3.500
290	2	2	0	56564	4.800	-3.423	0	5.882	-0.411	35° turn, 4.5 g & 5.167
291	2	2	0	47026	5.700	4.157	0	7.032	-0.567	35° turn, 4.5 g & 5.167
292	36	36	0	52696	4.957	-3.774	0	6.198	-0.628	35° turn, 5.5 g & 1.833
293	36	36	0	49312	5.275	-4.034	0	6.606	-0.683	35° turn, 5.5 g & 1.833
294	5	5	0	54235	4.812	-3.656	0	6.012	-0.603	35° turn, 5.5 g & 3.500
295	5	5	0	47774	5.421	-4.153	0	6.791	-0.709	35° turn, 5.5 g & 3.500
296	1	1	0	55773	4.666	-3.537	0	5.827	-0.578	35° turn, 5.5 g & 5.167
297	1	1	0	46235	5.566	-4.271	0	6.977	-0.734	35° turn, 5.5 g & 5.167
298	10	10	0	52058	4.807	-3.876	0	6.124	-0.793	35° turn, 6.5 g & 2.000
299	10	10	0	48366	5.155	-4.160	0	6.569	-0.854	35° turn, 6.5 g & 2.000
300	2	2	0	53904	4.633	-3.734	0	5.901	-0.763	35° turn, 6.5 g & 4.000

TABLE II Loading Conditions for F-14 Wing Outer Panel Fatigue Test (Continued)

Condition No.	W/C Test	WOP Test	$F_x$	$F_z$	$H_x$ ( $10^6$ )	$H_y$ ( $10^6$ )	$H_z$ ( $10^6$ )	$H_{xz}$ ( $10^6$ )	$H_y$ ( $10^6$ )	Description
301	9	2	0	46520	5.329	-4.302	0	6.791	-0.884	35° turn, 6.5 g & 4.000
302	3	3	0	51995	4.565	-4.137	0	6.054	-1.142	35° turn, 7.5 g & 2.000
303	3	3	0	48303	4.913	-4.421	0	6.499	-1.203	35° turn, 7.5 g & -2.000
304	0	0								
305	91	91	0	48874	4.070	3.882	0	5.621	-0.211	45° turn, 3.5 g & 1.833
306	91	91	0	45722	4.316	-4.172	0	5.997	-0.265	45° turn, 3.5 g & -1.833
307	9	9	0	50308	3.959	-3.751	0	5.450	-0.186	45° turn, 3.5 g & 3.500
308	9	9	0	44288	4.428	-4.304	0	6.168	-0.290	45° turn, 3.5 g & -3.500
309	2	2	0	51742	3.847	-3.619	0	5.279	-0.162	45° turn, 3.5 g & 5.167
310	2	2	0	42854	4.539	-4.435	0	6.338	-0.314	45° turn, 3.5 g & -5.167
311	64	64	0	58656	4.894	-4.749	0	6.812	-0.314	45° turn, 4.5 g & 1.833
312	64	64	0	55504	5.140	-5.039	0	7.188	-0.368	45° turn, 4.5 g & -1.833
313	8	8	0	60090	4.783	-4.618	0	6.642	-0.290	45° turn, 4.5 g & 3.500
314	8	8	0	54070	5.252	-5.171	0	7.359	-0.393	45° turn, 4.5 g & -3.500
315	2	2	0	61524	4.671	-4.486	0	6.471	-0.265	45° turn, 4.5 g & 5.167
316	2	2	0	52636	5.363	-5.302	0	7.530	-0.418	45° turn, 4.5 g & -5.16
317	25	25	0	60094	4.801	-5.025	0	6.926	-0.583	45° turn, 5.5 g & 1.833
318	25	25	0	56942	5.047	-5.315	0	7.302	-0.637	45° turn, 5.5 g & -1.833
319	3	3	0	61528	4.690	-4.894	0	6.755	-0.558	45° turn, 5.5 g & 3.500
320	3	3	0	55508	5.159	-5.447	0	7.472	-0.661	45° turn, 5.5 g & -3.500
321	1	1	0	62967	4.578	-4.762	0	6.584	-0.533	45° turn, 5.5 g & 5.167
322	1	1	0	54074	5.270	-5.578	0	7.643	-0.686	45° turn, 5.5 g & -5.167
323	8	8	0	61675	4.697	-5.288	0	7.022	-0.849	45° turn, 6.5 g & 2.000
324	8	8	0	58235	4.965	-5.604	0	7.432	-0.908	45° turn, 6.5 g & -2.000
325	1	1	0	63395	4.563	-5.130	0	6.817	-0.819	45° turn, 6.5 g & 4.000
326	1	1	0	56515	5.099	-5.762	0	7.637	-0.937	45° turn, 6.5 g & -4.000
327	2	2	0	63113	4.604	-5.564	0	7.135	-1.117	45° turn, 7.5 g & 2.000
328	2	2	0	59673	4.872	-5.880	0	7.545	-1.176	45° turn, 7.5 g & -2.000
329	0	0								
330	60	60	0	44924	3.200	-3.842	0	4.999	-0.112	55° turn, 3.5 g & 1.833

TABLE II Loading Conditions for F-14 Wing Outer Panel Fatigue Test (Continued)

Condition No.	Y/C Test	WOP Test	F <sub>x</sub>	F <sub>y</sub>	F <sub>z</sub>	H <sub>x</sub> (10 <sup>6</sup> )	H <sub>y</sub> (10 <sup>6</sup> )	N <sub>z</sub> (10 <sup>6</sup> )	H <sub>x</sub> (10 <sup>6</sup> )	H <sub>y</sub> (10 <sup>6</sup> )	Description
331	60	60	0	41036	3.372	-4.136	0.064	0	5.336	0.064	55° turn, 3.5 g & -1.833
332	6	6	0	45238	3.122	-3.709	0.134	0	4.856	0.134	55° turn, 3.5 g & 3.500
333	6	6	0	39222	3.451	-4.269	0.043	0	5.339	0.043	55° turn, 3.5 g & 3.500
335	1	1	0	46552	3.053	3.576	0.155	0	4.693	0.155	55° turn, 3.5 g & 5.167
335	1	1	0	38408	3.529	-4.402	0.021	0	5.642	0.021	55° turn, 3.5 g & -5.167
336	31	31	0	54396	4.005	-4.824	0.131	0	6.269	0.131	55° turn, 4.5 g & 1.833
337	31	31	0	51508	4.177	-5.118	0.083	0	6.605	0.083	55° turn, 4.5 g & -1.833
338	5	5	0	55710	3.927	-4.691	0.152	0	6.116	0.152	55° turn, 4.5 g & 3.500
339	5	5	0	50194	4.256	-5.251	0.061	0	6.759	0.061	55° turn, 4.5 g & -3.500
340	1	1	0	57024	3.848	-4.558	0.174	0	5.962	0.174	55° turn, 4.5 g & 5.167
341	1	1	0	48880	4.334	-5.384	0.039	0	6.912	0.039	55° turn, 4.5 g & -5.167
342	16	16	0	61898	4.490	-5.716	-0.045	0	7.269	-0.045	55° turn, 5.5 g & 1.833
343	16	16	0	59010	4.662	-6.010	-0.093	0	7.605	-0.093	55° turn, 5.5 g & -1.833
345	2	2	0	63212	4.412	-5.583	-0.023	0	7.116	-0.023	55° turn, 5.5 g & 3.500
345	2	2	0	57696	4.741	-6.143	-0.115	0	7.759	-0.115	55° turn, 5.5 g & -3.500
346	0	0	0	64526	4.333	-5.450	-0.002	0	6.962	-0.002	55° turn, 5.5 g & 5.167
347	0	0	0	56382	4.819	-6.276	-0.136	0	7.912	-0.136	55° turn, 5.5 g & -5.167
348	4	4	0	65626	4.547	-6.475	-0.473	0	7.898	-0.473	55° turn, 6.5 g & 2.000
349	4	4	0	62474	4.735	-6.795	-0.525	0	8.265	-0.525	55° turn, 6.5 g & -2.000
350	1	1	0	67202	4.453	-6.315	-0.447	0	7.714	-0.447	55° turn, 6.5 g & 4.000
351	1	1	0	60898	4.829	-6.955	-0.551	0	8.449	-0.551	55° turn, 6.5 g & -4.000
352	1	1	0	69221	4.612	-7.248	-0.903	0	8.543	-0.903	55° turn, 7.5 g & 2.000
353	1	1	0	66069	4.800	-7.568	-0.955	0	8.911	-0.955	55° turn, 7.5 g & -2.000
354	0	0	0								
355	95	95	0	34680	2.399	-3.842	0.511	0	4.501	0.511	68° turn, 3.5 g & 1.833
356	95	95	0	32168	2.483	-4.114	0.470	0	4.782	0.470	68° turn, 2.5 g & -1.833
357	10	10	0	35822	2.361	3.719	0.529	0	4.373	0.529	68° turn, 3.5 g & 3.500
358	10	10	0	31027	2.522	-4.237	0.451	0	4.910	0.451	68° turn, 3.5 g & -3.500
359	2	2	0	36963	2.322	-3.596	0.548	0	4.255	0.548	68° turn, 3.5 g & 5.167
360	2	2	0	29885	2.560	-4.360	0.433	0	5.036	0.433	68° turn, 3.5 g & -5.167



TABLE II - Loading Conditions for F-14 Wing Outer Panel Fatigue Test (Continued)

Condition	Altitude (ft)	Weight (lb)	$F_x$	$H_x$ ( $10^6$ )	$H_y$ ( $10^6$ )	$H_z$ ( $10^6$ )	$H_{x'}$ ( $10^6$ )	$H_{y'}$ ( $10^6$ )	Description
3c1	71	71	0	4.2057	4.732	0	5.544	0.631	68° turn, 4.5 g & 1.833
3c2	71	71	0	39546	5.004	0	5.826	0.590	68° turn, 4.5 g & -1.833
3c3	8	8	0	43200	-4.609	0	5.417	0.650	68° turn, 4.5 g & 3.500
3c4	8	8	0	38405	-5.127	0	5.953	0.572	68° turn, 4.5 g & -3.500
3c5	2	2	0	44341	4.486	0	5.799	0.668	68° turn, 4.5 g & 5.167
3c6	2	2	0	37263	-5.250	0	6.081	0.553	68° turn, 4.5 g & -5.167
3c7	28	28	0	49436	-5.621	0	6.587	0.751	68° turn, 5.5 g & 1.833
3c8	28	28	0	46924	-5.893	0	6.808	0.710	68° turn, 5.5 g & -1.833
3c9	3	3	0	50578	5.498	0	6.459	0.769	68° turn, 5.5 g & 3.500
3c10	3	3	0	45783	-6.016	0	6.996	0.692	68° turn, 5.5 g & -3.500
3c11	1	1	0	51719	-5.375	0	6.331	0.788	68° turn, 5.5 g & 5.167
3c12	1	1	0	44641	-6.139	0	7.123	0.673	68° turn, 5.5 g & -5.167
3c13	8	8	0	56927	-6.498	0	7.616	0.873	68° turn, 6.5 g & 2.000
3c14	8	8	0	54187	-6.794	0	7.973	0.828	68° turn, 6.5 g & -2.000
3c15	1	1	0	58297	-6.350	0	7.463	0.895	68° turn, 6.5 g & 4.000
3c16	1	1	0	52817	6.942	0	8.076	0.806	68° turn, 6.5 g & -4.000
3c17	2	2	0	62280	-7.146	0	8.327	0.858	68° turn, 7.5 g & 2.000
3c18	2	2	0	59540	-7.442	0	8.634	0.814	68° turn, 7.5 g & -2.000

Table III Calculation of Net Wing Pivot Loads for Symmetric Flight Conditions

Condition	$\Delta$	$b$	$q$	$F_z/q$	$M_x/q$	$M_y/q$	$F_{z,ALB}$	$M_{x,ALB} \times 10^6$	$M_{y,ALB} \times 10^6$	$F_z$	$M_x \times 10^6$	$M_y \times 10^6$	$M_{x'} \times 10^6$	$M_{y'} \times 10^6$
10	1.0	3.0	7.15	391.91	8600	4200	30961	-3.370	-1.666	4543	0.359	-0.227	-26418	-3.321
67	2.0	3.0	6.20	391.91	14500	6900	50948	5.683	-2.704	-6986	-0.553	0.349	43962	-2.355
85	3.0	3.0	6.0	391.91	16500	7844	51732	5.429	-3.074	-10794	0.854	0.539	40938	-2.535
89	4.0	6.0	25.0	391.91	13187	-8812	52477	5.168	-3.434	-13816	-1.093	0.690	38661	-2.764
90	5.0	7.0	34.0	391.91	12356	10022	53457	4.852	-3.928	-16015	1.267	0.800	37442	-3.128
91	6.0	8.0	42.5	391.91	11650	11050	54280	4.506	-4.331	-18643	1.316	0.832	37637	-3.499
92	7.0	9.0	50.3	503.864	5200	3800	-26705	-2.620	1.915	4543	0.314	-0.286	-22162	1.629
93	8.0	10.0	57.6	503.864	11700	8100	59960	5.895	-6.182	-7571	0.524	0.477	52389	-3.705
94	9.0	11.0	64.0	503.864	11725	9613	63336	5.807	-4.844	-13124	-0.969	0.826	50212	-4.018
95	10.0	12.0	70.0	503.864	11758	10863	66510	5.723	-5.473	-16400	1.135	1.032	50110	-4.441
96	11.0	13.0	76.0	503.864	11500	12050	69533	5.643	-6.072	-18171	1.258	1.144	51362	-4.928
101	12.0	14.0	82.0	628.625	3750	3050	-27659	-2.337	2.294	4543	0.260	-0.376	-23116	1.958
102	13.0	15.0	88.0	628.625	8500	8700	65377	5.532	-5.469	-8625	-0.494	0.638	56752	-4.831
103	14.0	16.0	94.0	628.625	8700	11900	81721	5.639	7.481	-18171	-0.040	1.345	63550	-6.136
106	15.0	17.0	100.0	768.143	2000	2650	-22276	1.536	2.036	4543	0.198	-0.376	-17733	1.660
107	16.0	18.0	106.0	768.143	6500	8300	69133	4.993	-6.376	-10232	-0.445	0.847	58901	-5.529
108	17.0	19.0	112.0	768.143	7100	10400	86032	5.434	-7.989	-16309	-0.710	0.135	69723	-7.854
109	18.0	20.0	118.0	768.143	7050	10800	87952	5.415	-8.296	-18171	-0.791	0.150	69781	-8.146
112	19.0	21.0	124.0	969.196	5000	1600	-13569	-0.872	1.551	4549	0.108	-0.412	-9020	1.139
113	20.0	22.0	130.0	969.196	4600	-8500	72205	4.652	-8.218	-13631	0.330	1.256	58324	-6.980
114	21.0	23.0	136.0	969.196	5200	-10000	85289	5.040	-9.692	-18171	0.432	1.644	67118	-8.048

TABLE IV VARIATION OF WING CENTER OF PRESSURE LOCATION WITH SWEEP ANGLE

Wing Sweep Angle, Degrees	Wing Center of Pressure Location, Inches	Wing Center of Pressure Location, Inches
15°	122.5	2.1
35°	121.0	2.1
45°	120.0	0.0
55°	115.9	-4.0
65°	134.0	-16.1

TABLE V SUMMARY OF C.G. LOAD FACTORS FOR ARRESTED LANDING CONDITIONS:  
AIRCRAFT NO. 98 FATIGUE TEST

Condition No.	Description	Drag, lb	$N_x$	$N_z$
60, 61, 66, 67 64, 65, 70, 71	Upper 90%	171000	3.169	-.0913
62, 63, 68, 69	Mean	159000	2.947	-.0849

Notes: - Taken from reference (c)  
 -  $N_x$  and angular accelerations omitted  
 - 143,000 lb conditions (64, 65, 70, 71) combined  
 with 171,000 lb conditions per NAVAIR direction

TABLE VI SUMMARY OF C.G. LOAD FACTORS FOR CATAPULT CONDITIONS:  
AIRCRAFT NO. 98 FATIGUE TEST

Condition No.	Description	$N_x$	$N_z$
72	Tow = 237000 lb	3.592	1.114
73	Tow = 213000 lb	3.055	1.103
74	Tow = 180000 lb	2.792	1.088

Notes: Taken from reference (c)  
-  $N_y$  and angular accelerations zero



TABLE VIII - Flight Data For Wing Sweep Change Under Load

CHANGE IN WING SWEEP AT VARIOUS  
LEVELS OF WING BEARING AXIAL LD  
CYCLES FOR 185.2 HOURS

BEARING LOAD RANGE LD	WING SWEEP CHANGE														
	0.3	2.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0			
0.	57	26	8	2	~	~	~	~	1	~	13	98			
50000.	500	112	92	10	5	1	4	2	~	1	1	~			
100000.	3261	703	411	105	56	35	13	19	22	16	16	~			
150000.	2869	401	169	46	19	14	7	1	~	1	3	~			
200000.	1065	195	69	23	9	9	2	3	4	~	~	~			
250000.	765	160	53	11	3	5	~	1	~	~	~	~			
300000.	741	156	39	7	1	~	~	~	~	~	~	~			
350000.	652	191	50	5	2	~	2	~	~	~	~	~			
400000.	603	193	54	10	2	1	~	~	~	~	~	~			
450000.	455	182	36	1	~	~	~	~	~	~	~	~			
500000.	298	125	25	1	1	~	~	~	~	~	~	~			
550000.	92	27	3	~	~	~	~	~	~	~	~	~			
600000.	20	9	1	~	~	~	~	~	~	~	~	~			
650000.	2	1	~	~	~	~	~	~	~	~	~	~			
700000.	~	~	~	~	~	~	~	~	~	~	~	~			
750000.	~	~	~	~	~	~	~	~	~	~	~	~			
800000.	~	~	~	~	~	~	~	~	~	~	~	~			
850000.	~	~	~	~	~	~	~	~	~	~	~	~			
900000.	~	~	~	~	~	~	~	~	~	~	~	~			

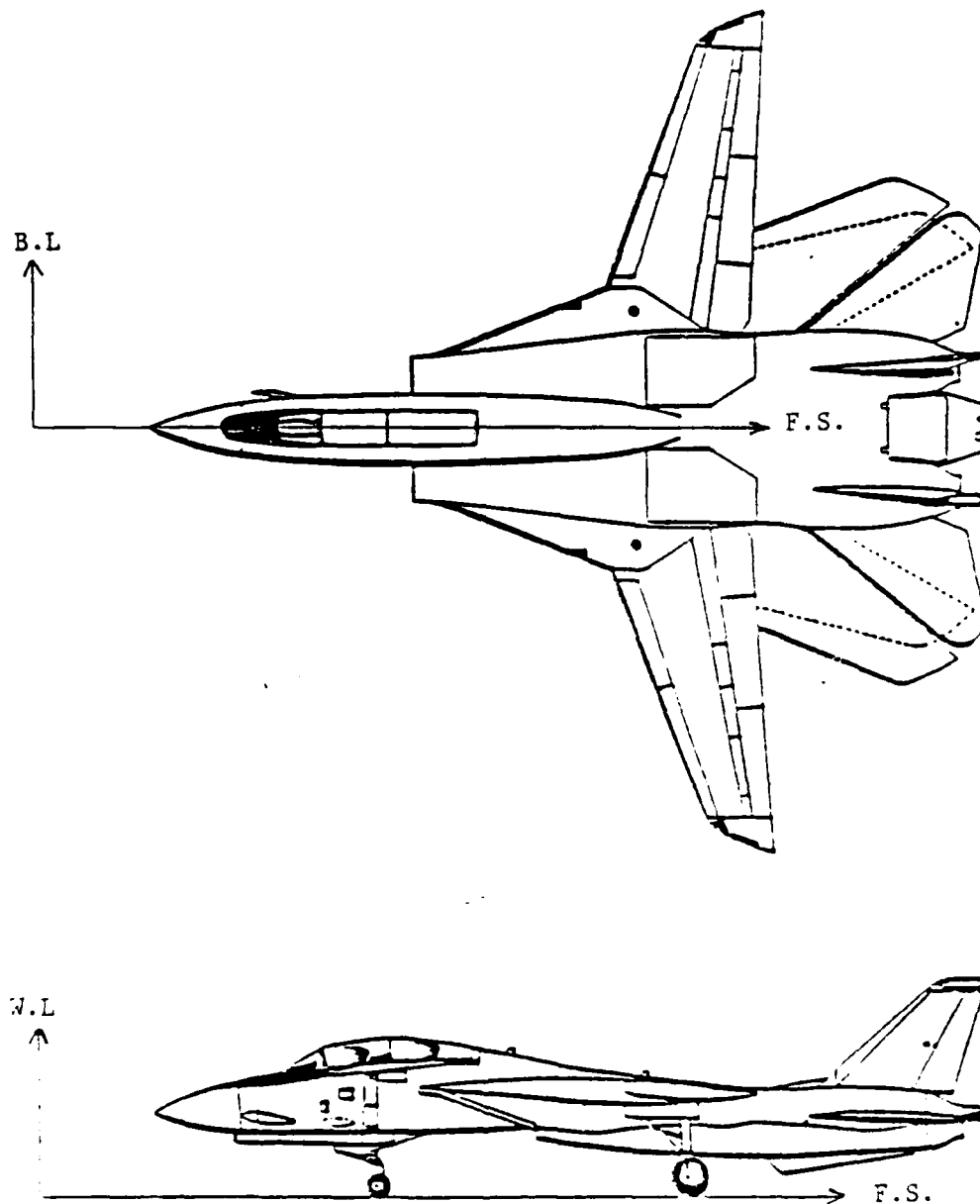
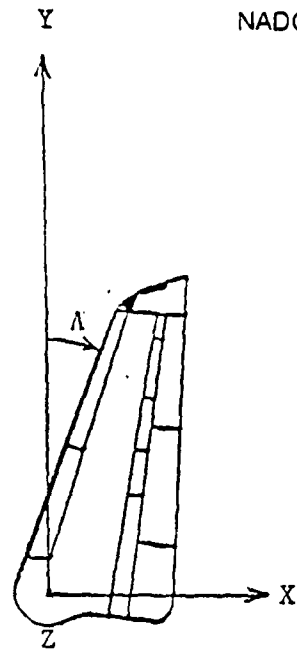


Figure 1. Axes and Sign Conventions

a. Aircraft Axis System





Origin at Wing Pivot Axis

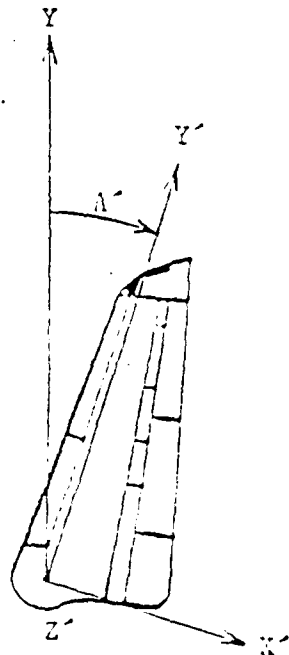
F.S. = 524.203

B.L. = 107.000

W.L. = 145.000

Forces positive as shown  
Right hand rule for moments

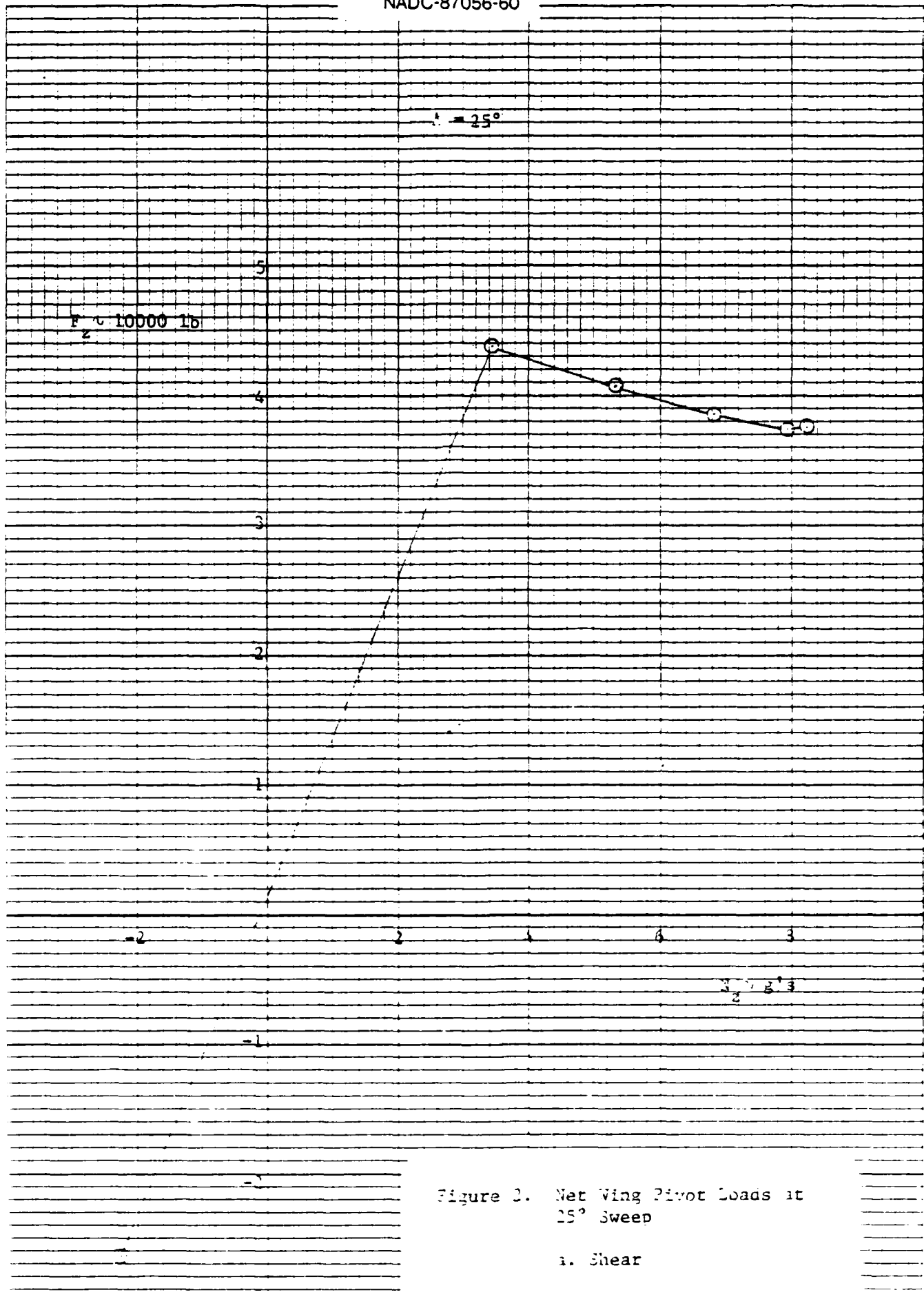
b. Unswept Wing Axis System



$$A' = A - 3.5^\circ$$

c. Wing Outer Panel Axis System

Figure 1. Axes and Sign Conventions Cont.



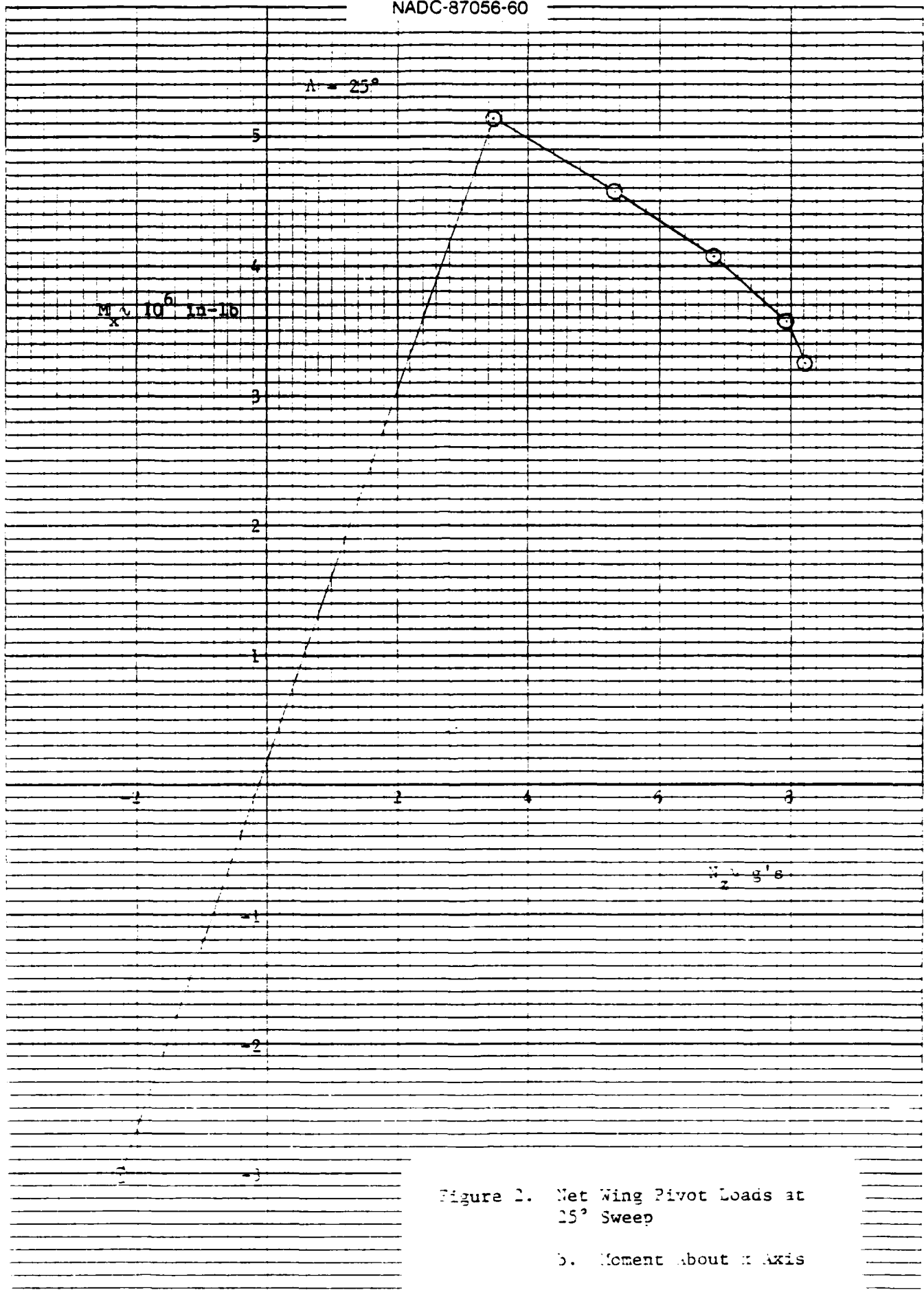


Figure 2. Net Wing Pivot Loads at 25° Sweep

b. Moment about x Axis

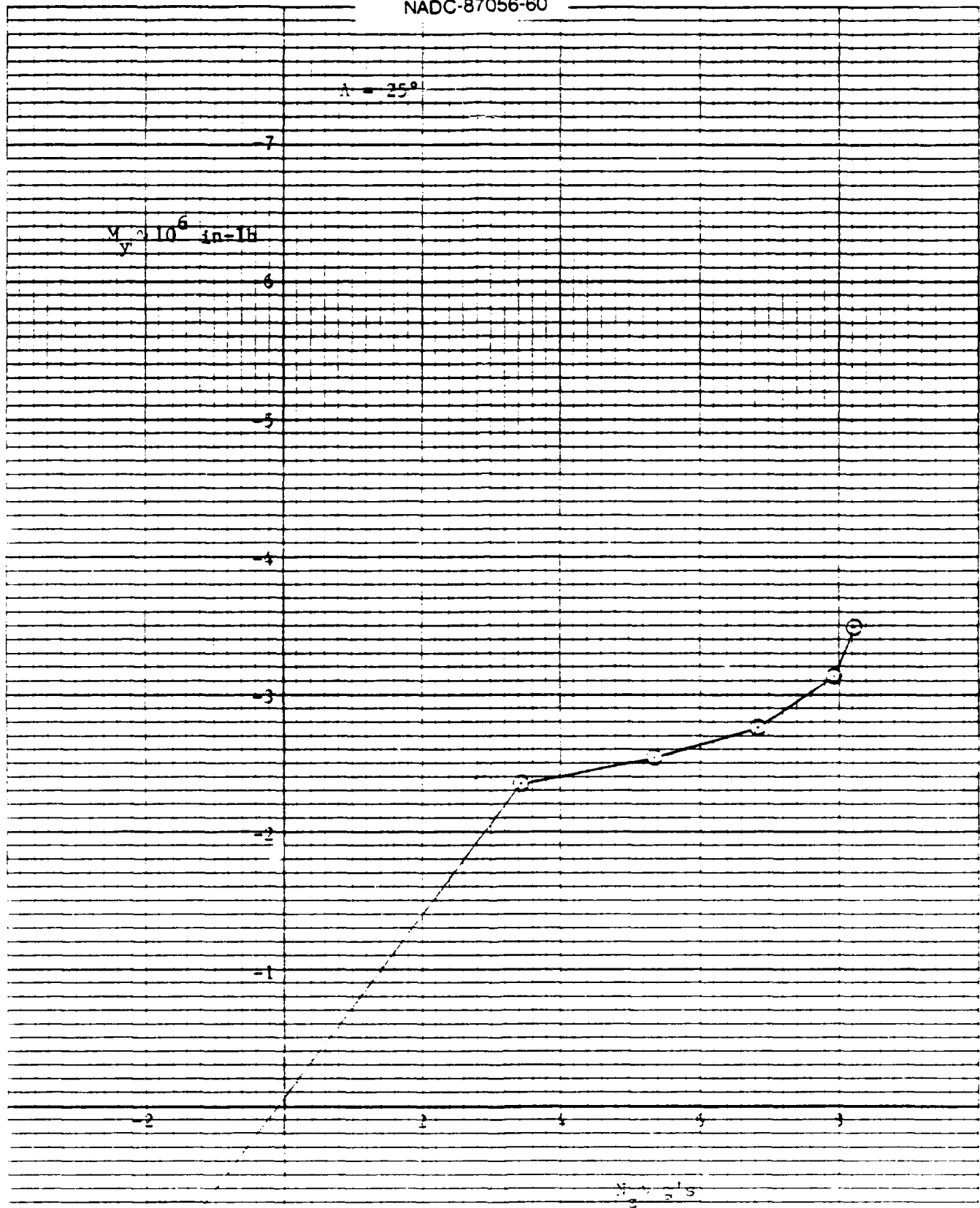


Figure 1. Net Wing Pivot Loads at  $25^\circ$  Sweep

1. Moment About  $y$  Axis

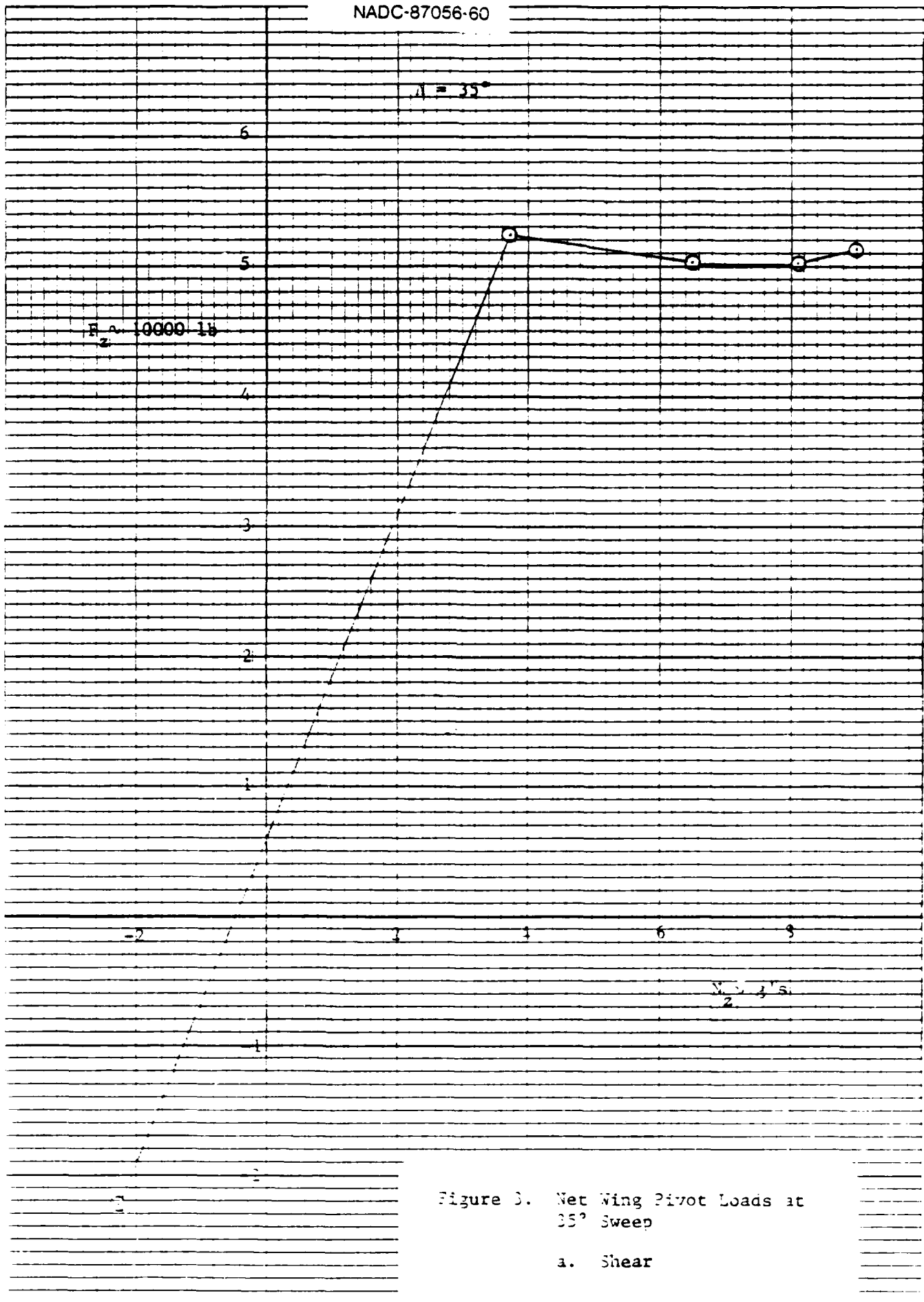


Figure 3. Net Wing Pivot Loads at 35° Sweep

a. Shear

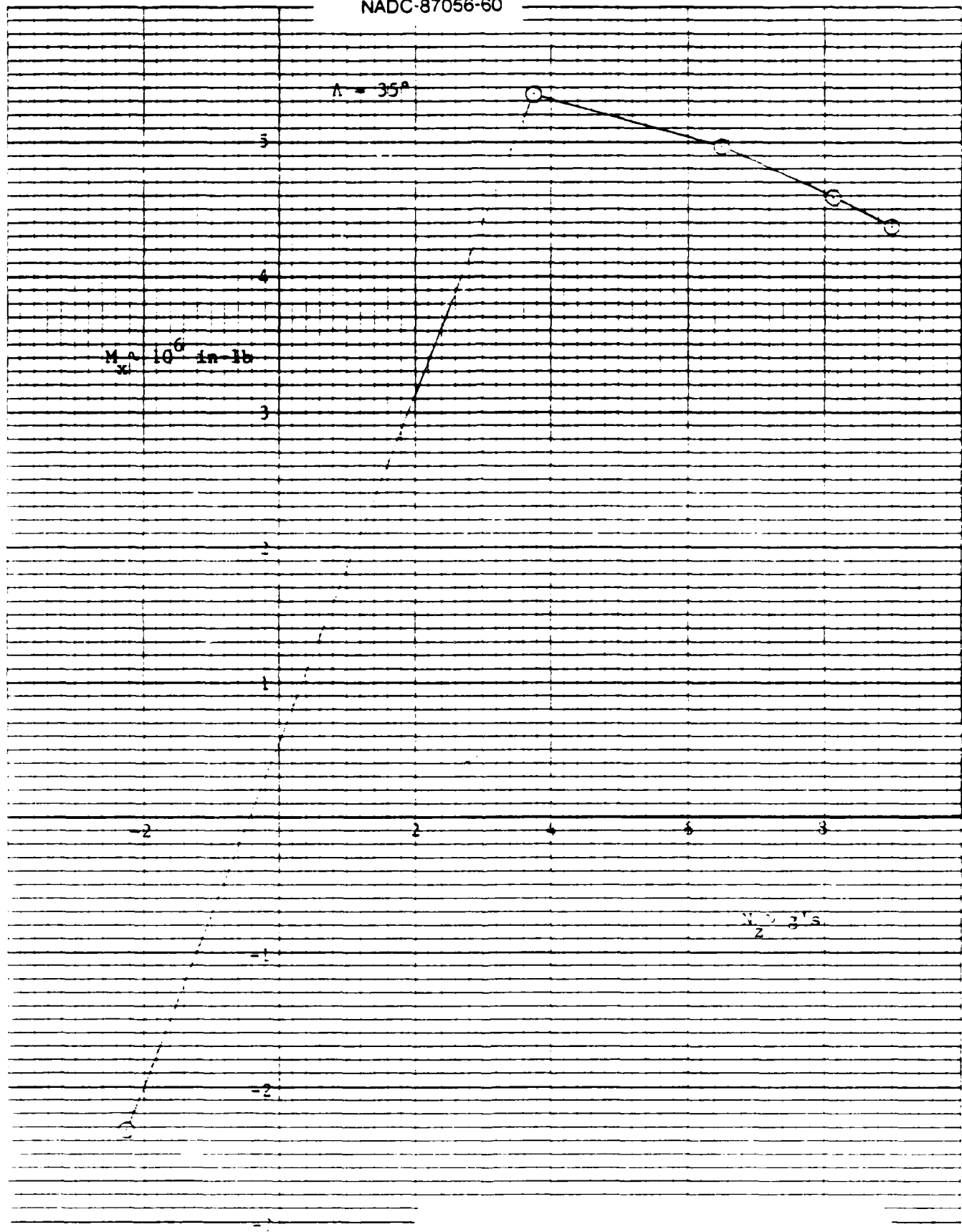


Figure 3. Net Wing Pivot Loads at  
35° Sweep

5. Moment About x Axis

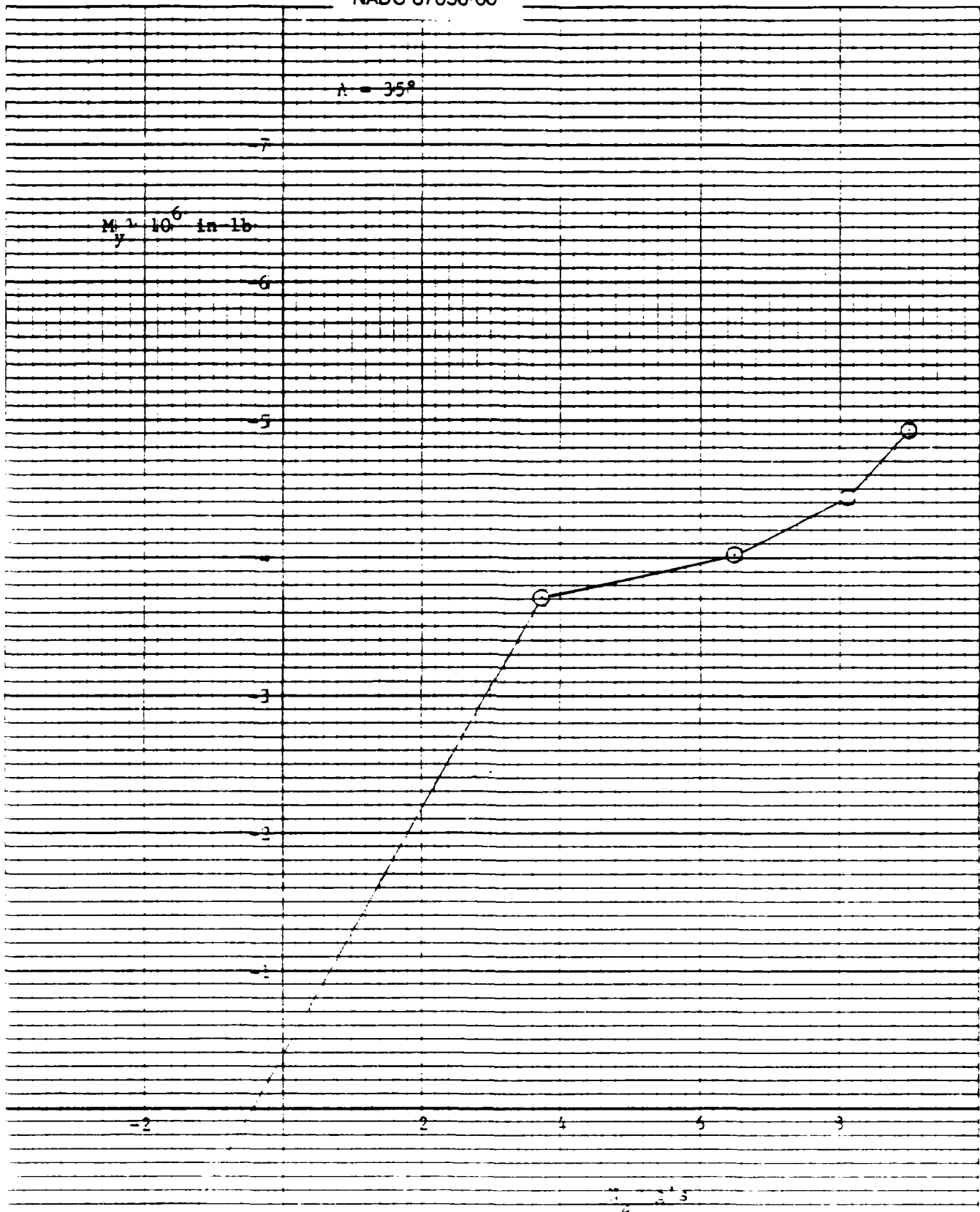
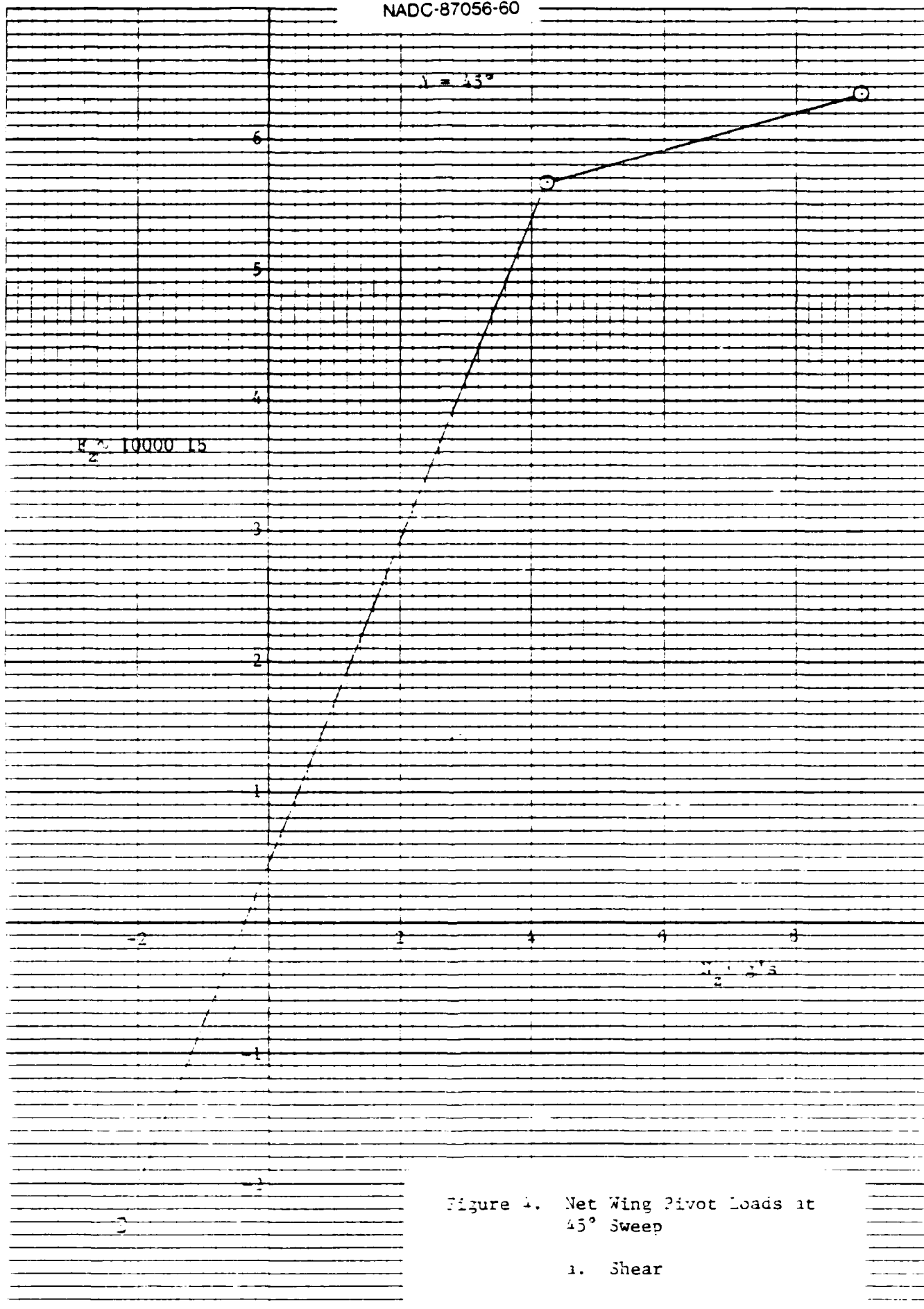
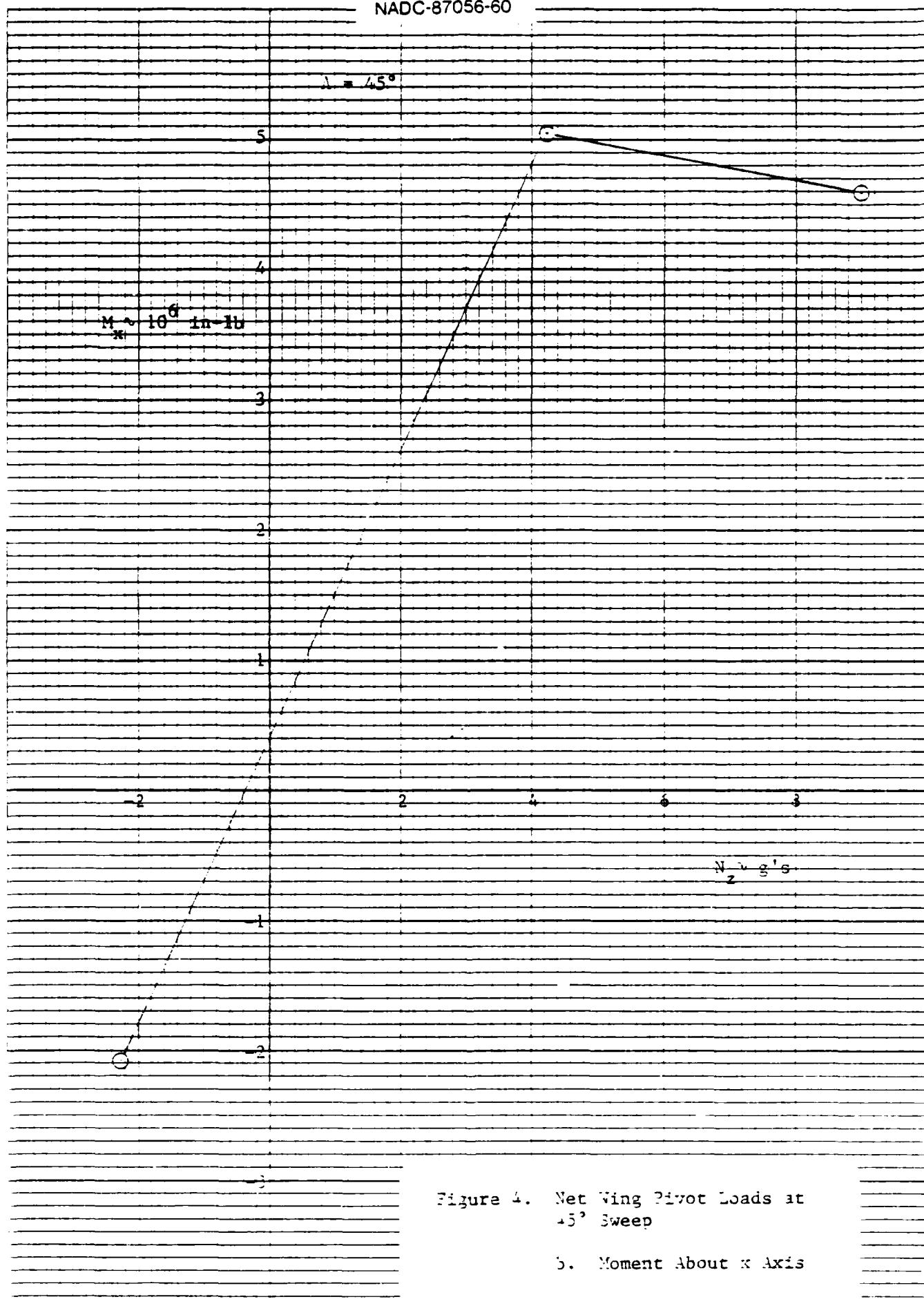


Figure 3. Net Wing Pivot Loads at  $35^\circ$  Sweep

a. Moment About y Axis







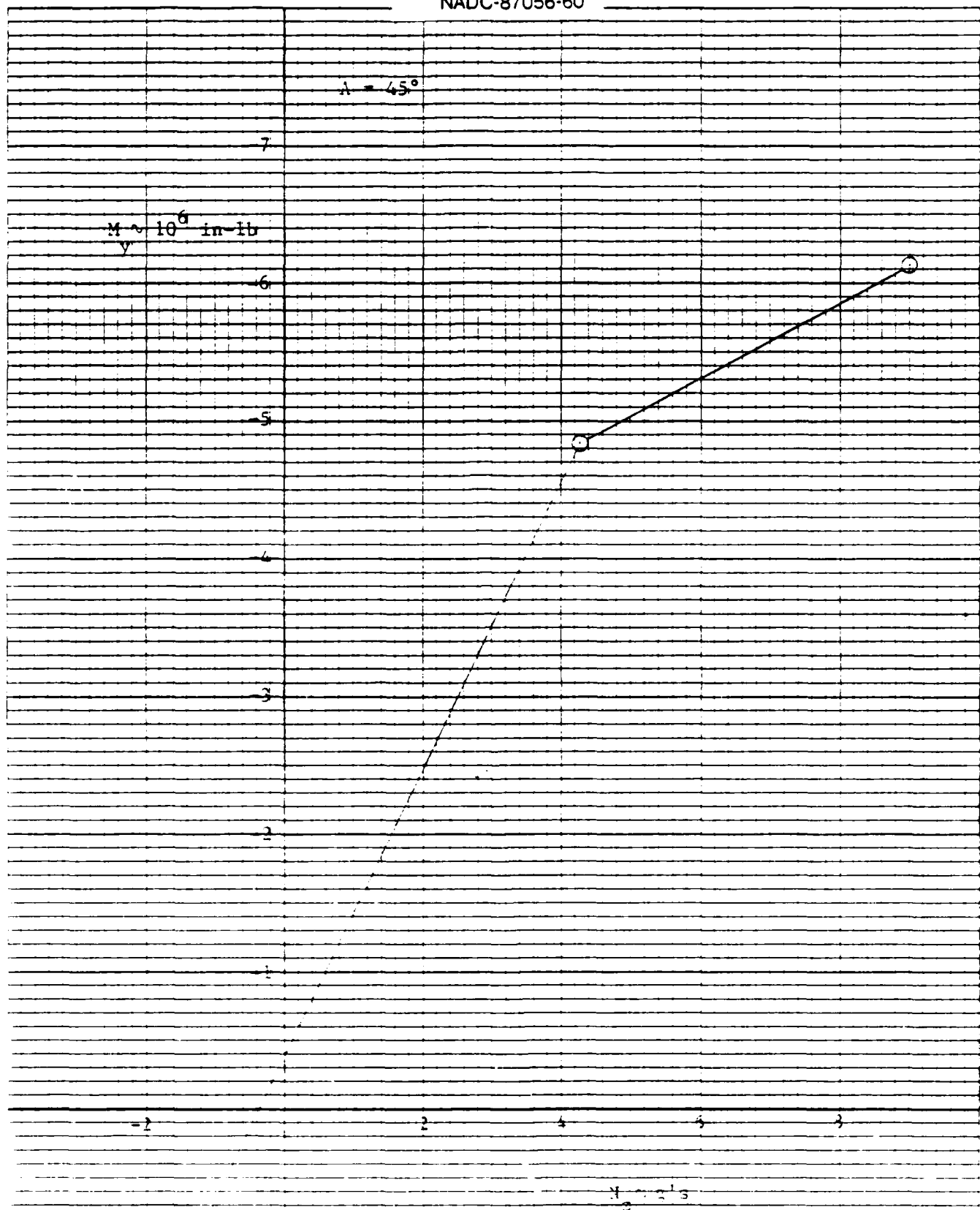
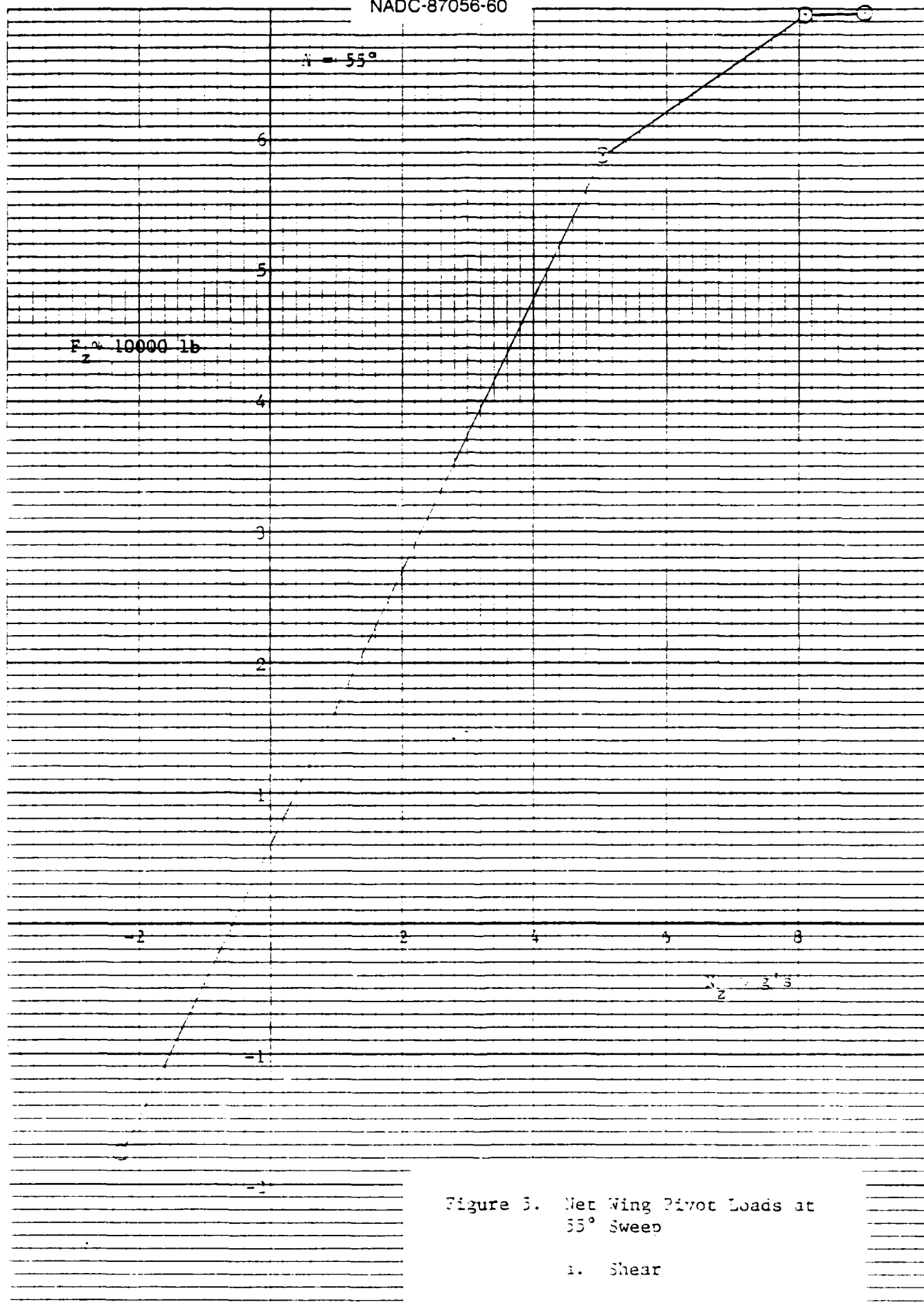
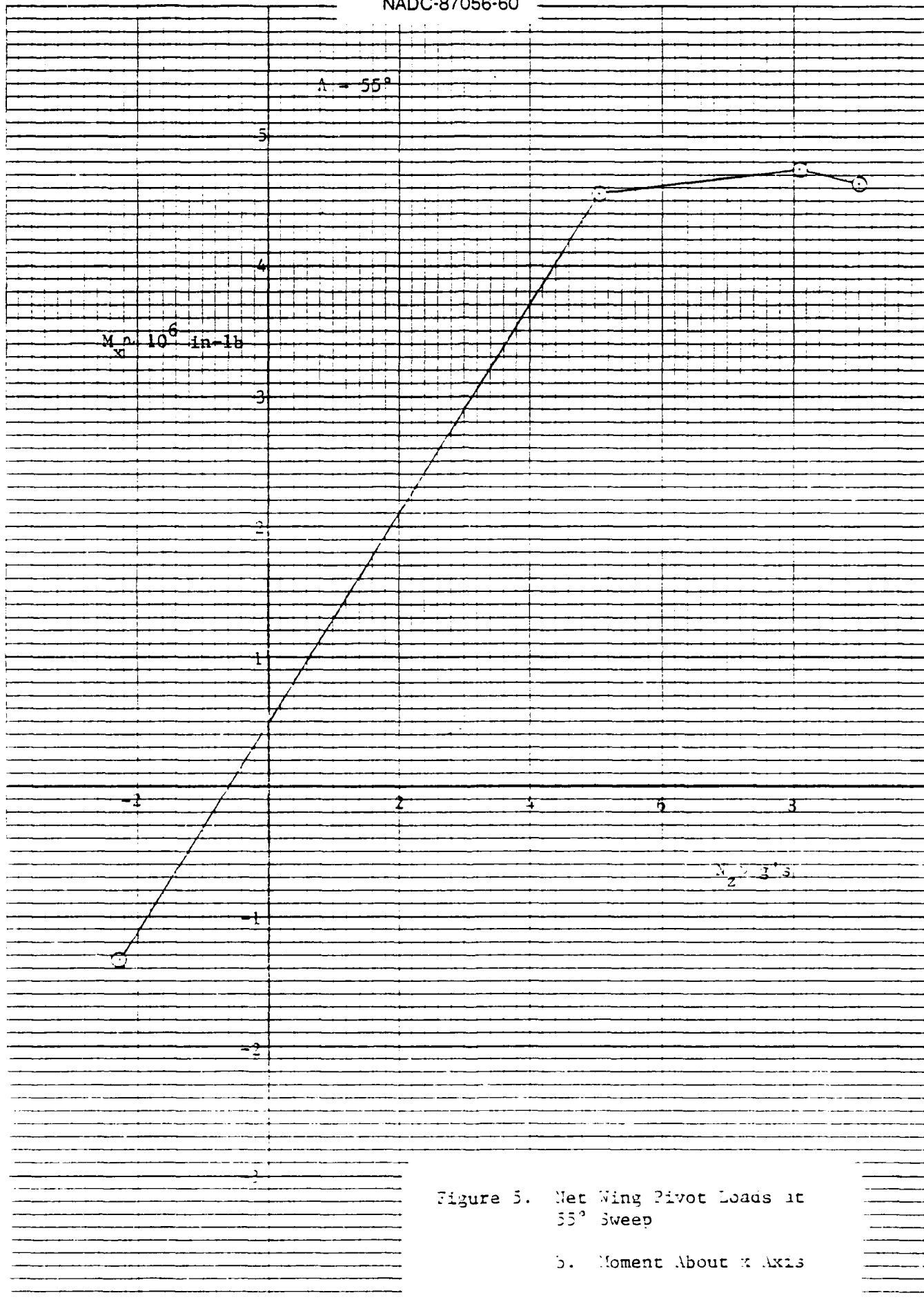


Figure 4. Net Wing Pivot Loads at  $45^\circ$  Sweep

1. Moment About  $y$  Axis





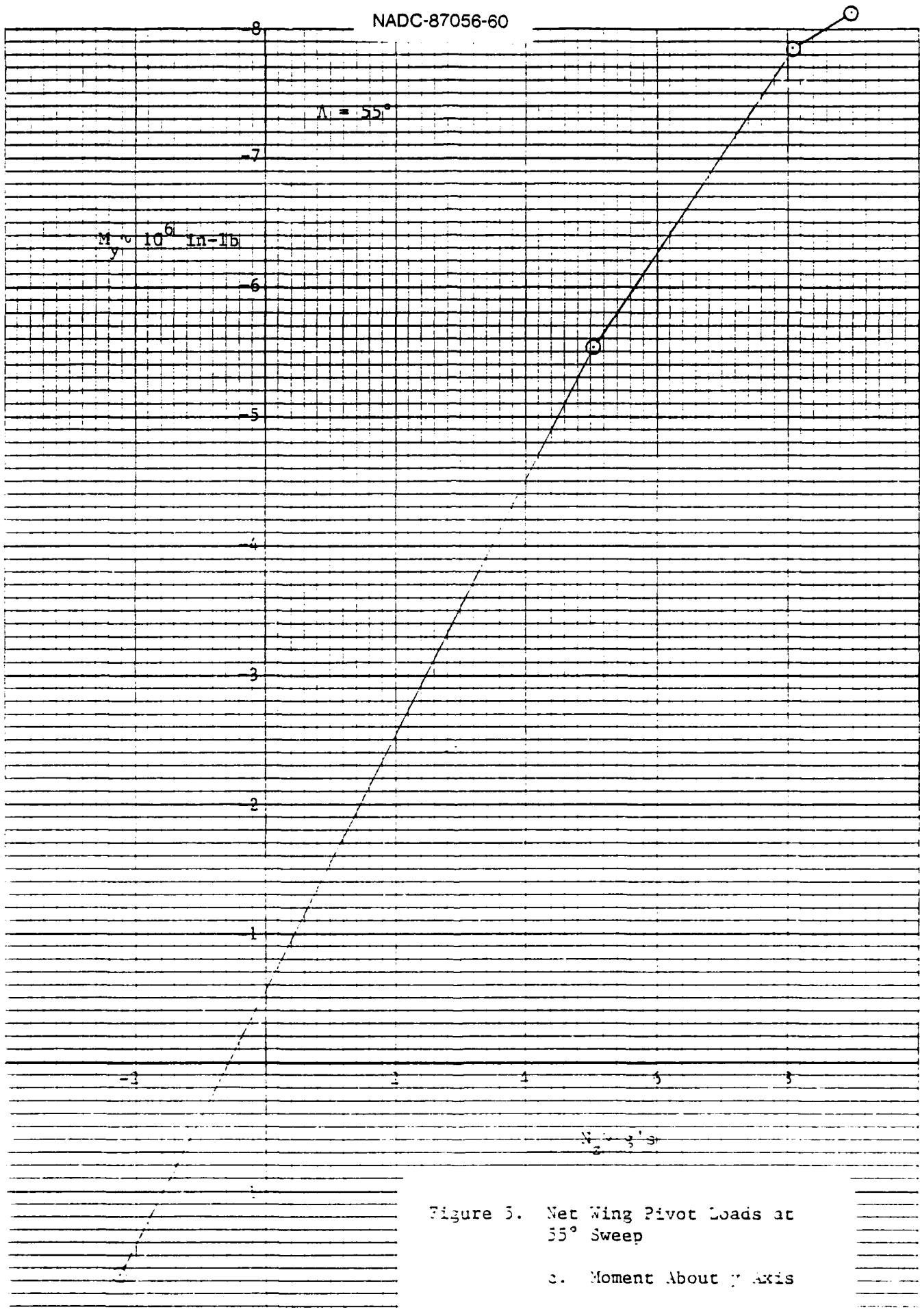


Figure 5. Net Wing Pivot Loads at  $55^\circ$  Sweep

c. Moment About y Axis

$\Lambda = 68^\circ$

$F_z = 10000 \text{ lb}$

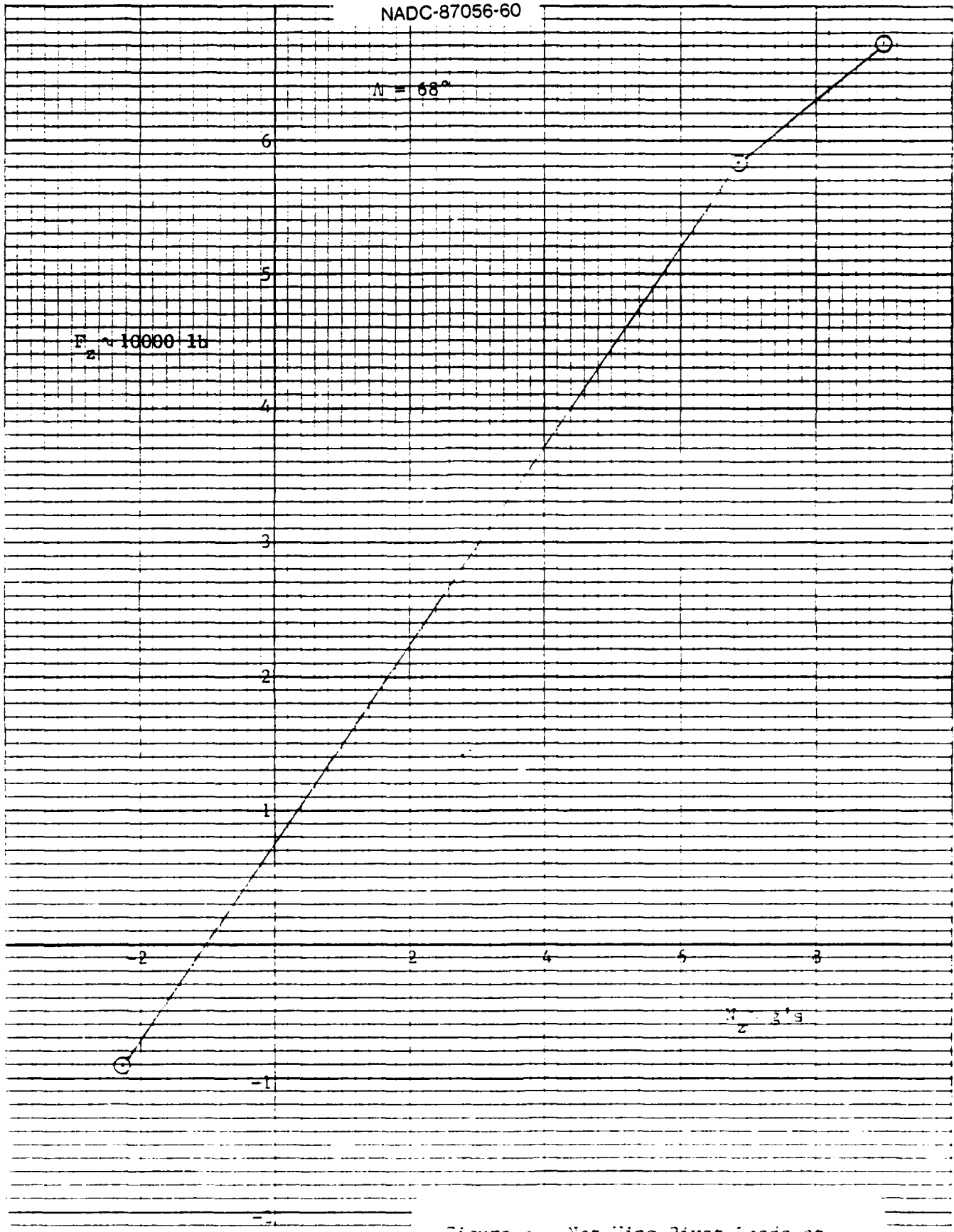


Figure 6. Net Wing Pivot Loads at  $68^\circ$  Sweep

1. Shear

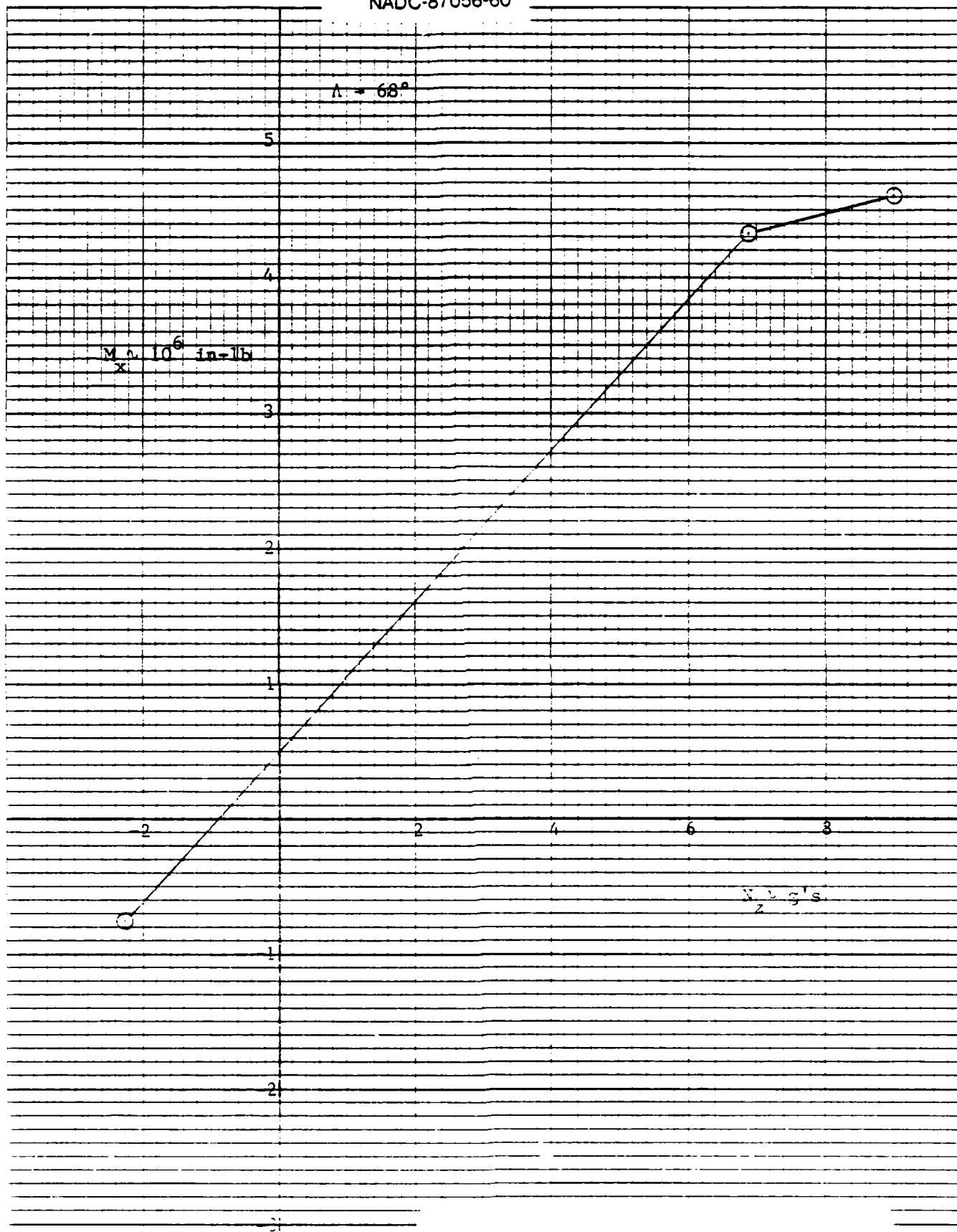
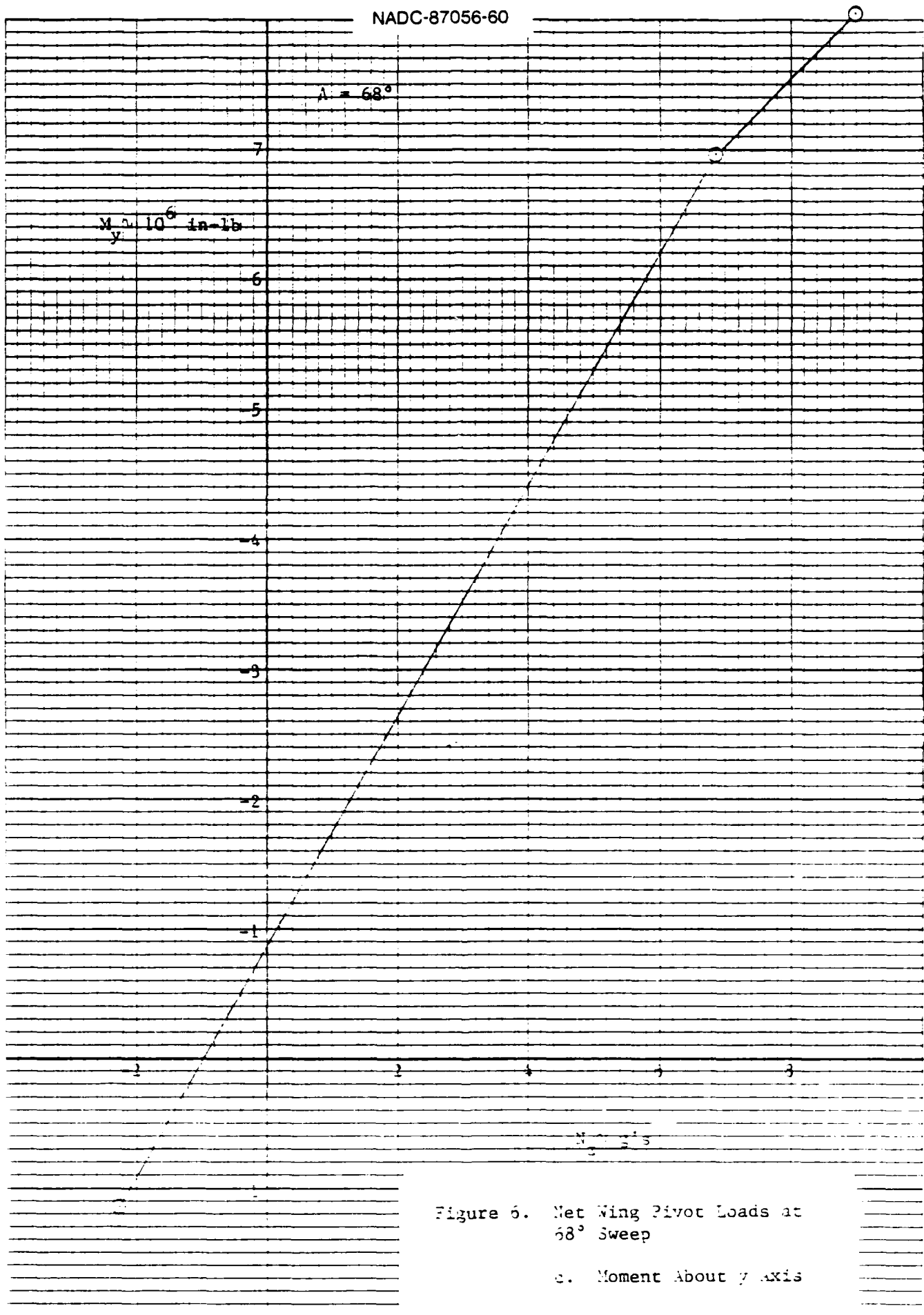


Figure 6. Net Wing Pivot Loads at  $68^\circ$  Sweep

6. Moment About x Axis





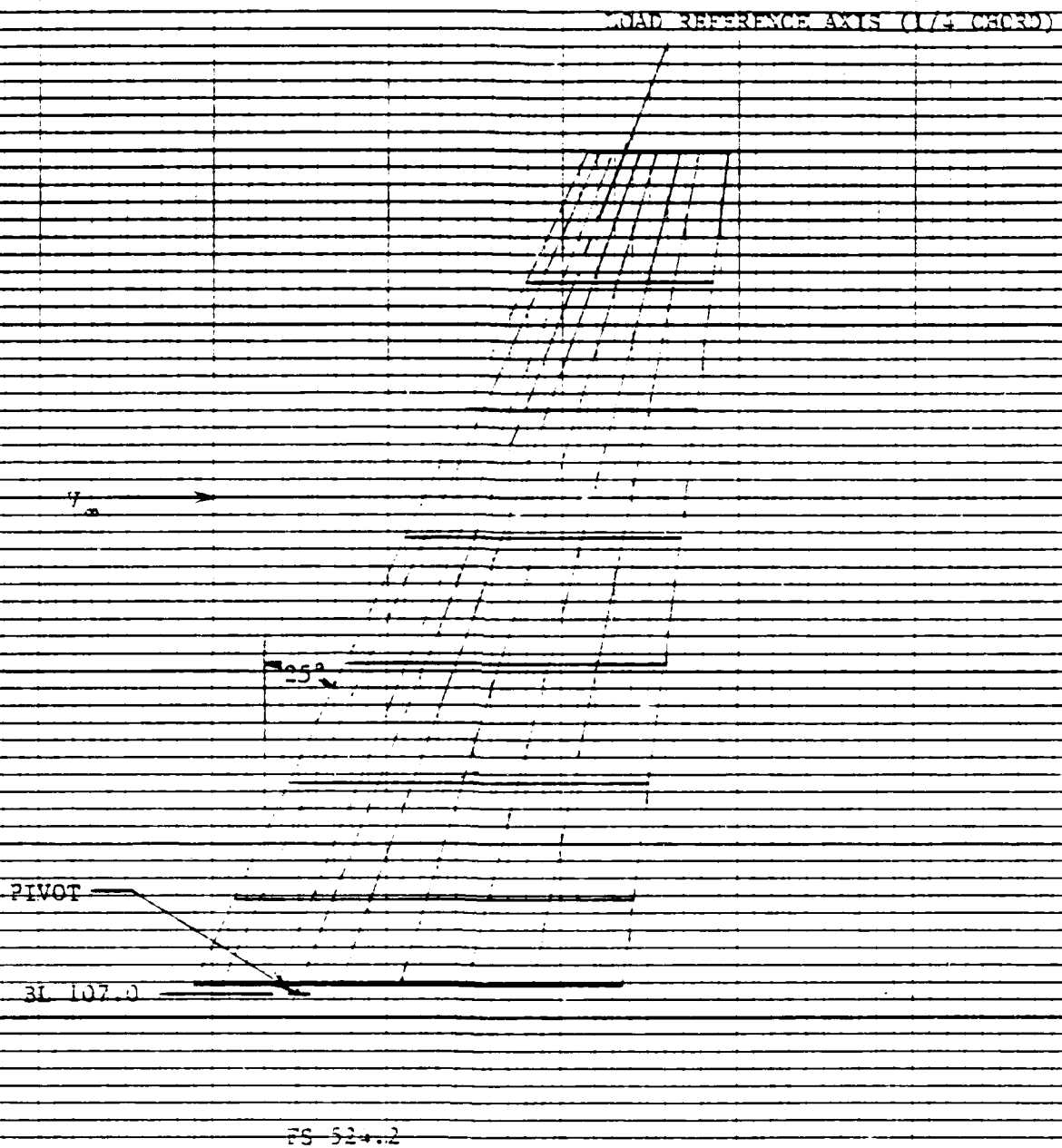


Figure 7. Aerodynamic Model of F-14  
Wing Outer Panel

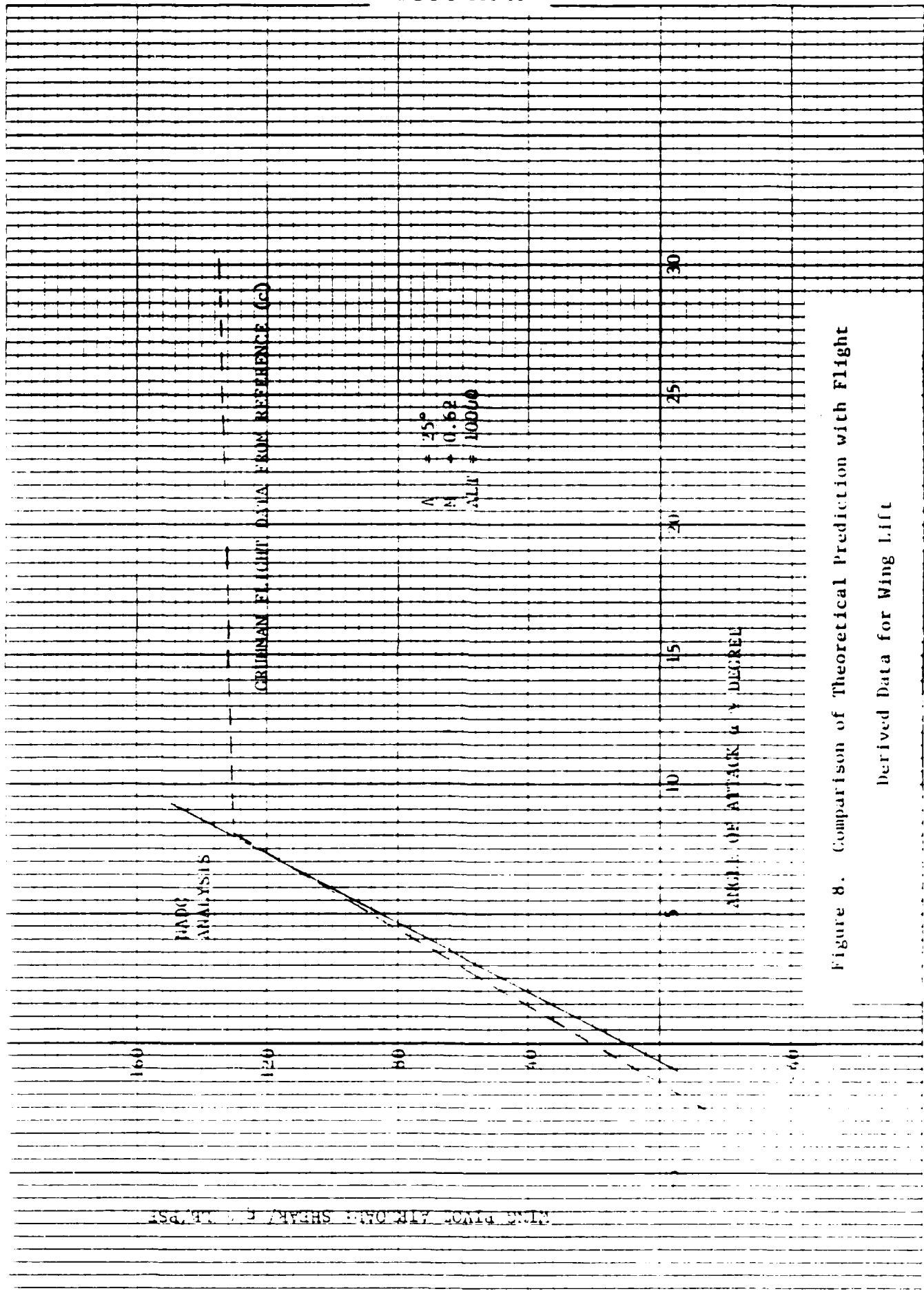


Figure 8. Comparison of Theoretical Prediction with Flight  
Derived Data for Wing Lift

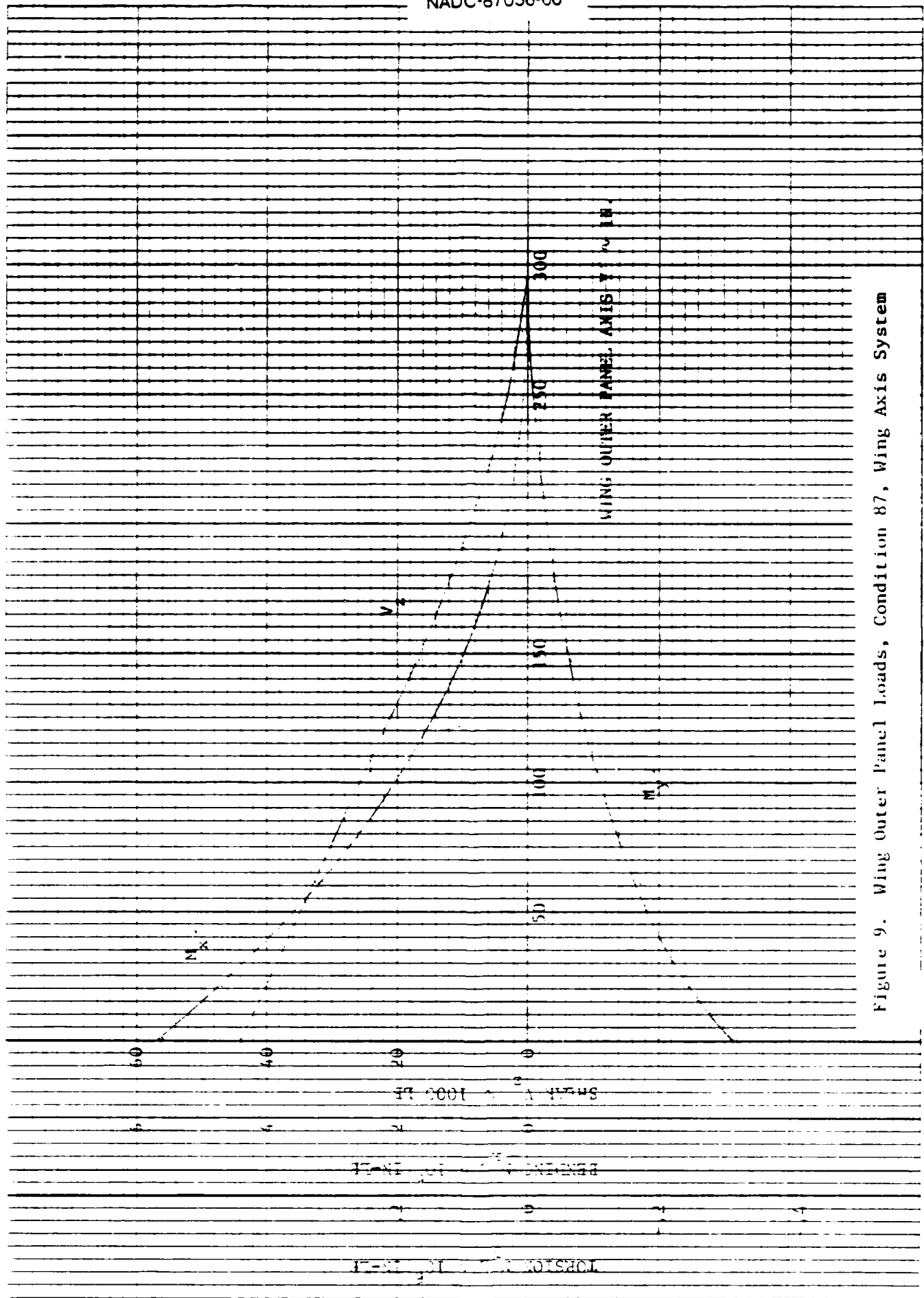


Figure 9. Wing Outer Panel Loads, Condition 87, Wing Axis System

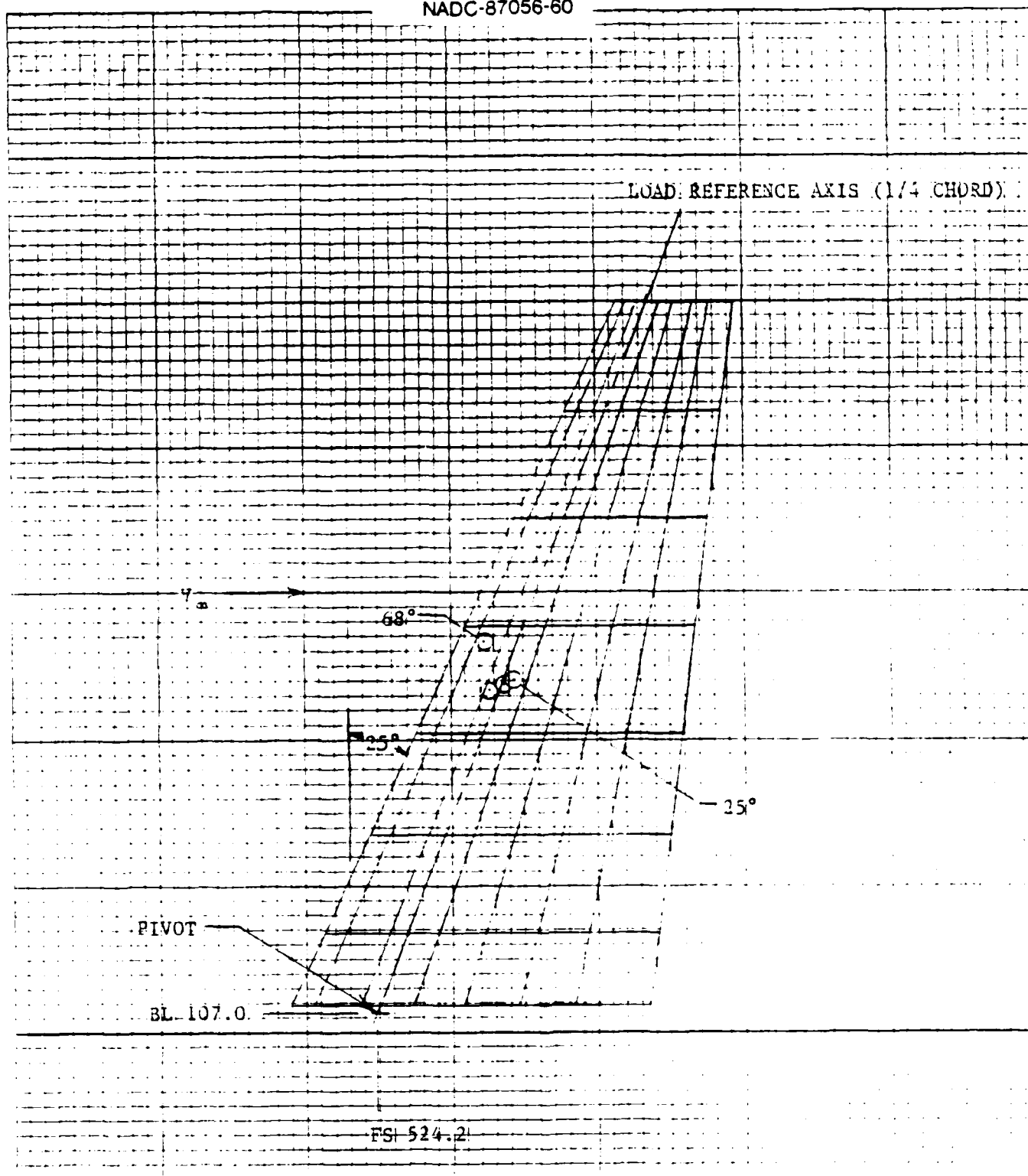


Figure 10. Wing Center of Pressure Location at Various Sweep Angles

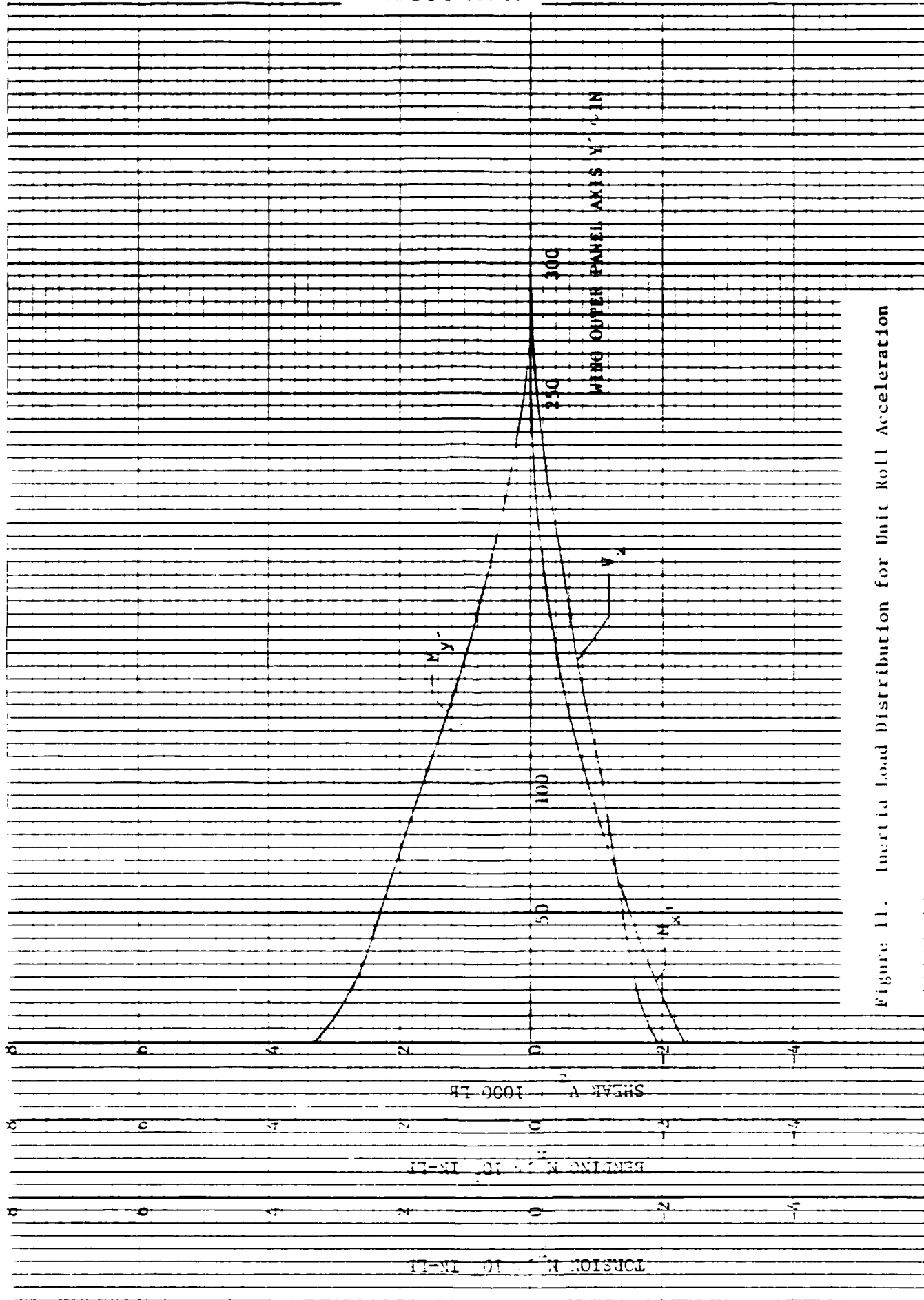


Figure 11. Inertia Load Distribution for Unit Roll Acceleration

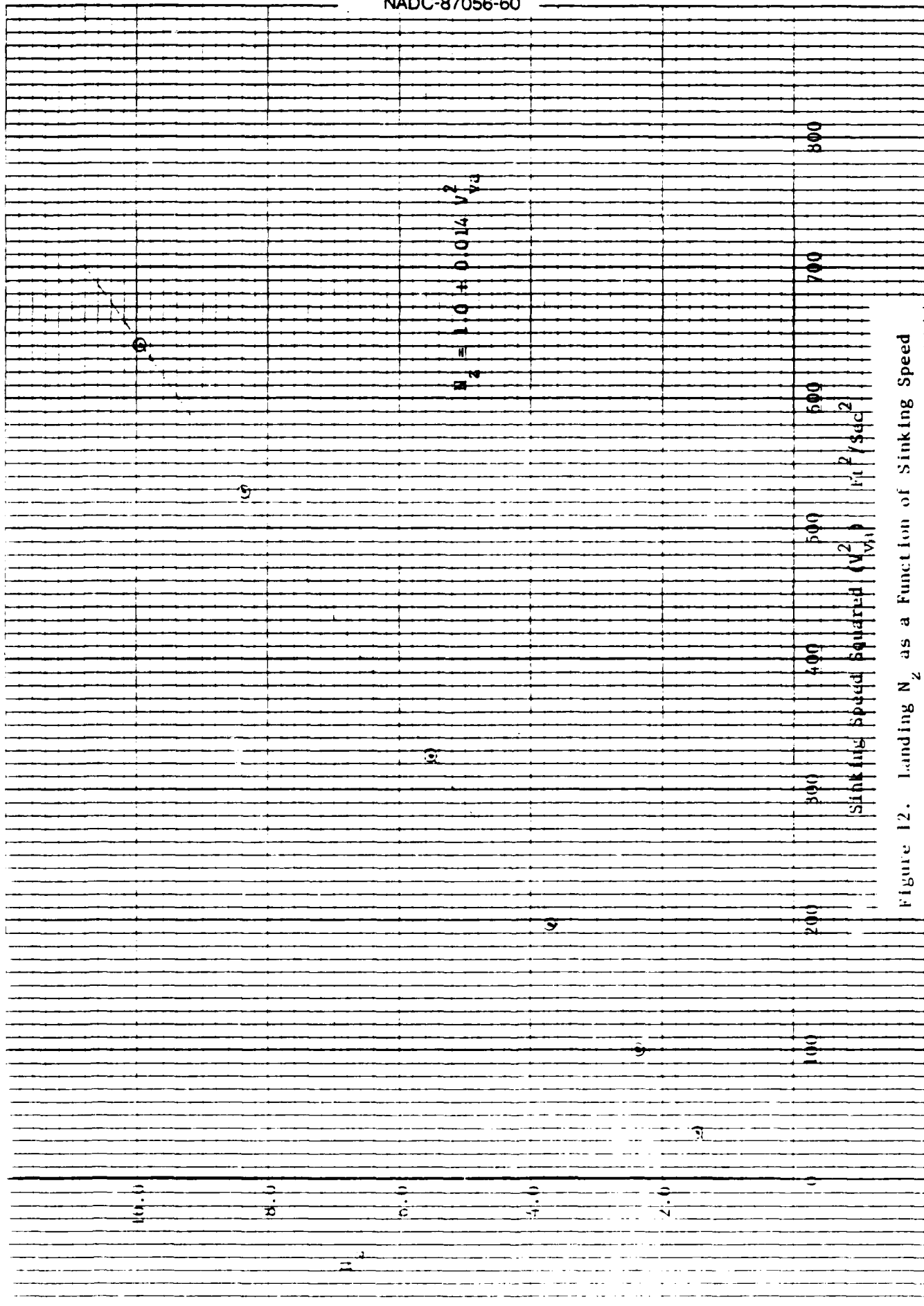
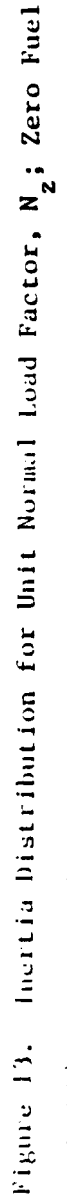


Figure 12. Landing  $N_z$  as a Function of Sinking Speed



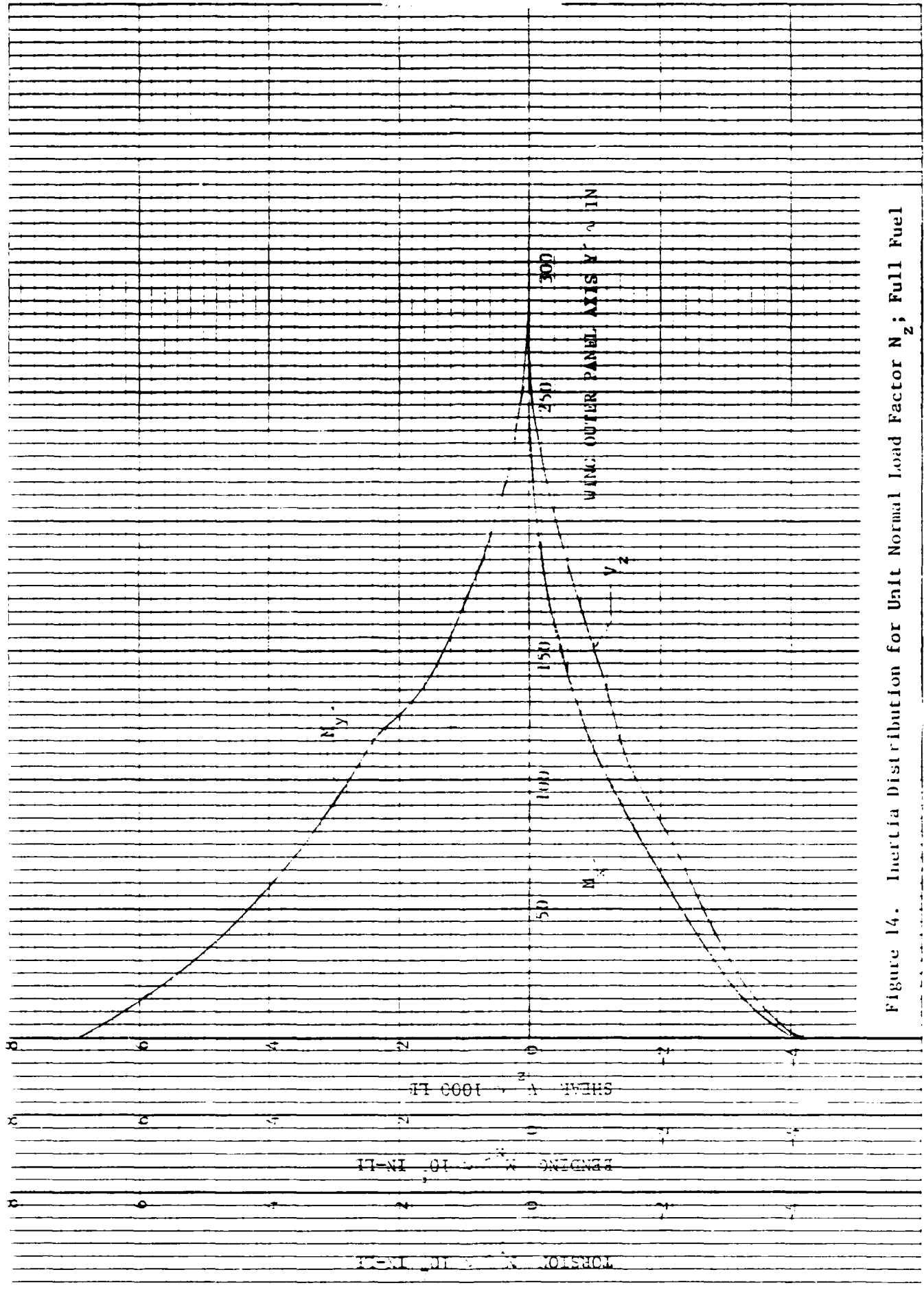


Figure 14. Inertia Distribution for Unit Normal Load Factor  $N_z$ ; Full Fuel



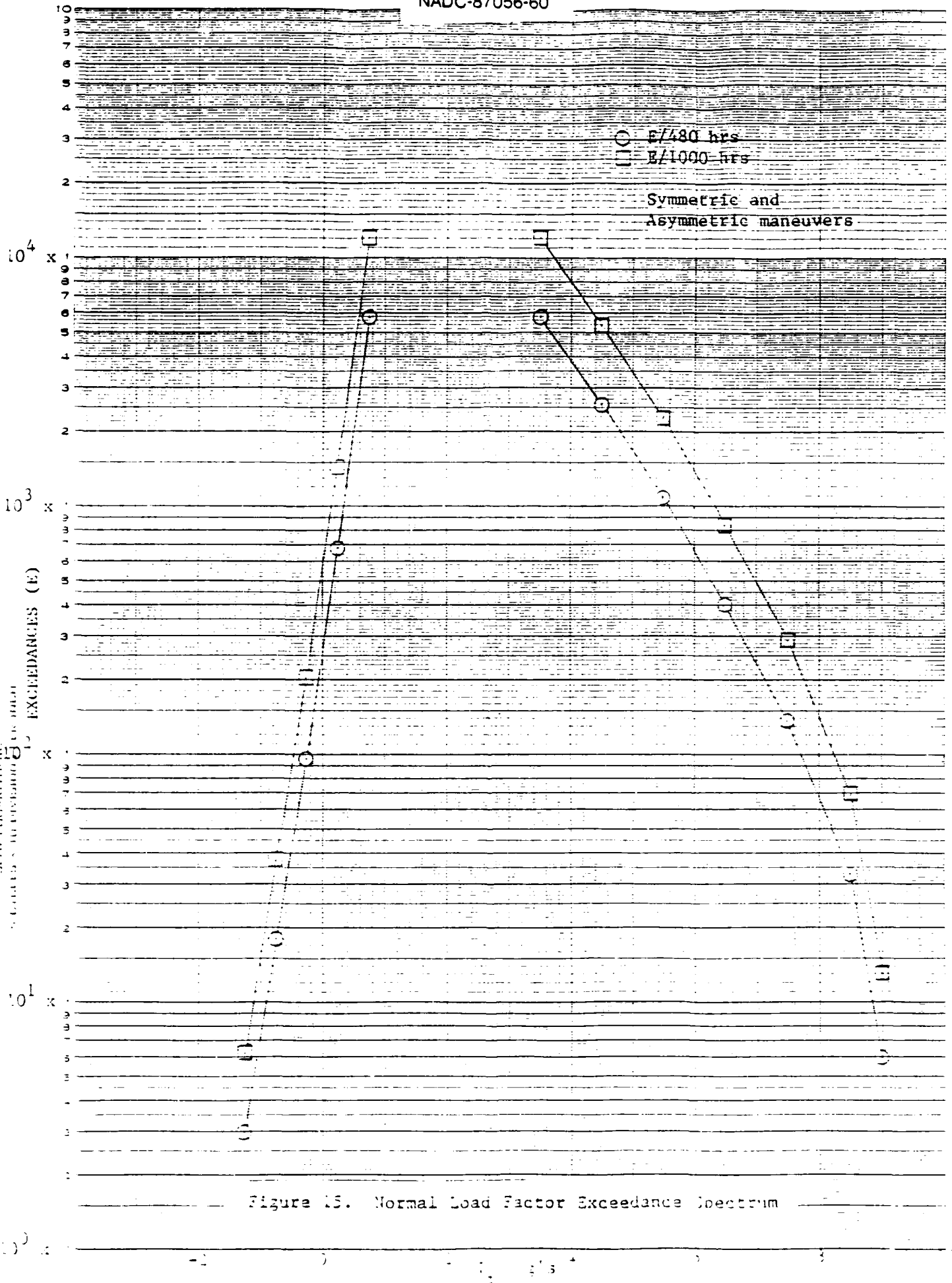
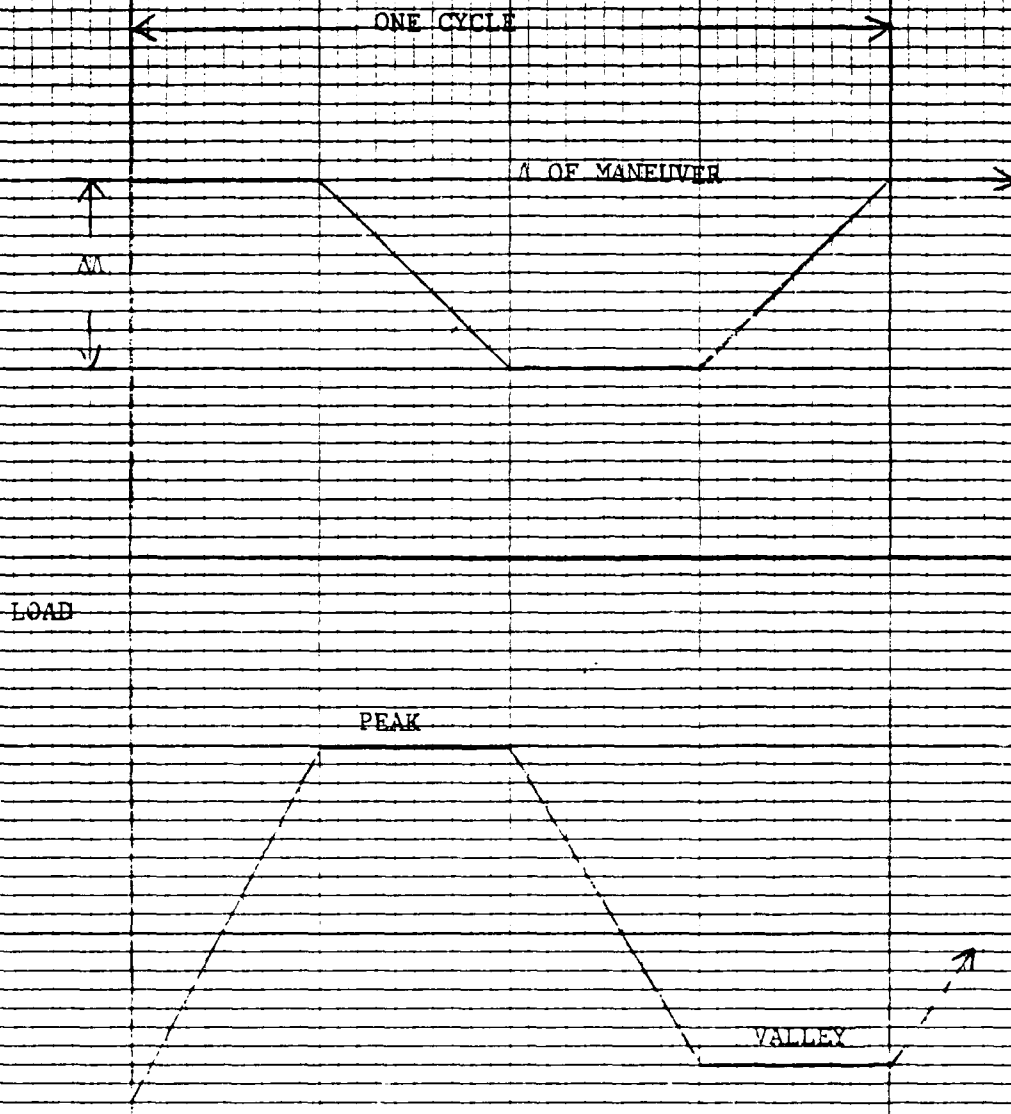


Figure 15. Normal Load Factor Exceedance Spectrum



Note:  $\Delta L = 5^\circ$ , if  $\Delta L_E = 25^\circ$  or if  
 550000 lb bearing load  $\leq$  650000 lb  
 $\Delta L = 10^\circ$  for any other  $\Delta L_E$  and if  
 bearing load  $\leq$  650000 lb

Figure 16. Wing Pivot Cycle

APPENDIX (A)

SEQUENTIAL SPECTRUM FOR AIRCRAFT #98 TEST

NOTE: Appendices (A) and (B) contain a flight-by-flight random sequence of load levels for 440 flights (480 hours). All printout lines (records) have the same format, which is described below:

<u>Columns</u>	<u>Format</u>	<u>Description</u>
1-4	I4	Flight number identification (1 to 440)
5-7	3X	Not used
8-9	I2	The number of loads in this line
10-69	20I3	These numbers identify the load conditions to be applied to the test article.

1 20156156 87 87157155 87 87157155 156156227228156156273274160155  
1 20156156 87 87159155 87 87157155 156156156156255256157155156156  
1 20 87 87157155 87 87157155 156156156255256157155156156 87 87  
1 20159155 87 87158155 156156229230156156255256157154156156 87 87  
1 16157155 156156156156255256157155156156 38 39156156  
2 20156156 87 87157155 87 87157155 156156227228156156255256157155  
2 20156156 87 87158155 87 87157155 156156156156263264158155156156  
2 20 87 87158155 87 87159155 156156227228156156255256157155156156  
2 20 87 87157155 87 87159155 156156156156255256157154156156 87 87  
2 18157155 156156156156255256157155156156 56 57156156 30 31  
2 20 32 85156156148149156156 30 31 32 85156156148149156156 20 21  
2 4 22 85156156  
3 20156156 87 87157155 87 87157155 156156156156261262158155156156  
3 20 87 87158155 87 87157155 156156156156273274160154156156 87 87  
20157152 87 87158155 156156156156261262158155156156 87 87157155  
20 87 87157155 156156156156255256157155156156 87 87160155156156  
3 12156156261262158155156156148149156156  
4 20156156 87 87157155 87 87157155 156156156156263264158155156156  
4 20 87 87158153 87 87157155 156156156156275276160155156156 87 87  
4 20158155 87 87157152156156227228229230156156255256157155156156  
4 20 87 87158155 87 87157155 156156229230156156255256157155156156  
4 18 87 87157155 156156229230156156267268159155156156 38 39  
4 2156156  
5 20156156 87 87158155 87 87157155 156156156156269270159155156156  
5 20 87 87158155 87 87160155 156156227228156156255256157155156156  
5 20 87 87157155 87 87157155 156156227228156156261262158155156156  
5 20 87 87157155 87 87157155 156156156156255256157155156156 87 87  
5 16159154156156156273274160155156156 38 39156156  
6 20156156 87 87157155 87 87158155 156156229230156156255256157155  
6 20156156 87 87157155 87 87157155 156156156156267268159154156156  
6 20 87 87157155 87 87161155 156156156156255256157154156156 87 87  
6 20161155 87 87158155 156156156267268159155156156 87 87159155

6 18156156229230156156261262158155156156 48 49 50 51 63 85  
6 14 81 84 82 84 83 74 77 80 77 80 74156156156  
7 20156156 87 87157155 87 87 91155156156156156255256157154156156  
7 20 87 87159155 87 87158155156156227228156156261262158155156156  
7 20 87 87157155 87 87157155156156156261262158155156156 87 87  
7 20157155 87 87158155156156156261262158155156156 87 87158154  
7 18156156156257258157155156156 20 21 22 85156156 33 34  
7 20 35 85156156148149156156 38 39156156 33 34 35 85156156 33 34  
7 4 35 85156156  
8 20156156 87 87161155 87 87158155156156227228156156267268159155  
8 20156156 87 87158155 87 87159155156156227228156156261262158155  
8 20156156 87 87157155 87 87157155156156156267268159155156156  
8 20 87 87157155 87 87157155156156227228156156255256157155  
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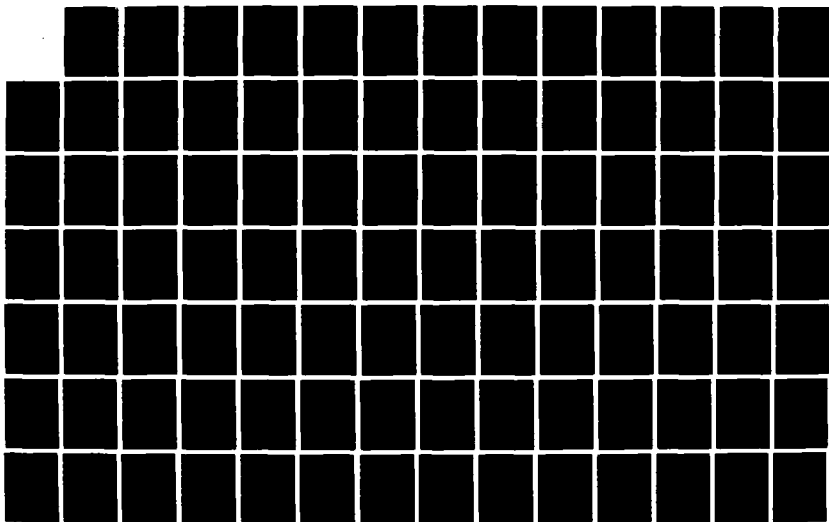
F-14 WING OUTER PANEL FATIGUE TEST SPECTRUM(U) NAVAL  
AIR DEVELOPMENT CENTER WARMINSTER PA AIR VEHICLE AND  
CREE SYSTEMS TECHN OLOGY DIRECTORATE G S SEIDEL ET AL.  
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MICROCOPY RESOLUTION TEST CHART  
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 436 18186186187185187184186186239240186186 17 18 19 85156156  
 437 20186186188185187185186186239240186186311312188185186186187184  
 437 20188185186186239240186186311312188185186186187185189184186186  
 437 2018618630530618718518618618718518718518618624124239240186186  
 437 18327328191185186186187184187185186186186186 56 57156156  
 438 20186186187185187185186186241242186186305306187185186186188185



NADC-87056-60

APPENDIX (B)

SEQUENTIAL SPECTRUM FOR WING OUTER PANEL TEST

1	15156	87157155	87157155	156227228156273274160155	0	0	0	0	0
1	13156	87159155	87157155	156255256157155156	0	0	0	0	0
1	13	87157155	87157155	156255256157155156	87	0	0	0	0
1	15159155	87158155	156229230156255256157154156	87	0	0	0	0	0
1	10157155	156255256157155156	20156	0	0	0	0	0	0
2	15156	87157155	87157155	156227228156255256157155	0	0	0	0	0
2	13156	87158155	87157155	156263264158155156	0	0	0	0	0
2	15	87158155	87159155	156227228156255256157155156	0	0	0	0	0
2	13	87157155	87159155	156255256157154156	87	0	0	0	0
2	11157155	156255256157155156	17156	9	0	0	0	0	0
2	10	85156	20156	9	85156	20156	20	0	0
2	2	85156	0	0	0	0	0	0	0
3	13156	87157155	87157155	156261262158155156	0	0	0	0	0
3	13	87158155	87157155	156273274160154156	87	0	0	0	0
3	14157152	87158155	156261262158155156	87157155	0	0	0	0	0
3	12	87157155	156255256157155156	87160155	0	0	0	0	0
3	8156261262158155156	20156	0	0	0	0	0	0	0
4	13156	87157155	87157155	156263264158155156	0	0	0	0	0
4	13	87158153	87157155	156275276160155156	87	0	0	0	0
4	16158155	87157152	156227228229230156255256157155156	0	0	0	0	0	0
4	15	87158155	87157155	156229230156255256157155156	0	0	0	0	0
4	13	87157155	156229230156267268159155156	20	0	0	0	0	0
4	1156	0	0	0	0	0	0	0	0
5	13156	87158155	87157155	156269270159155156	0	0	0	0	0
5	15	87158155	87160155	156227228156255256157155156	0	0	0	0	0
5	15	87157155	87157155	156227228156261262158155156	0	0	0	0	0
5	13	87157155	87157155	156255256157155156	87	0	0	0	0
5	10159154	156273274160155156	20156	0	0	0	0	0	0
6	15156	87157155	87158155	156229230156255256157155	0	0	0	0	0
6	13156	87157155	87157155	156267268159154156	0	0	0	0	0
6	13	87157155	87161155	156255256157154156	87	0	0	0	0
6	14161155	87158155	156267268159155156	87159155	0	0	0	0	0

6 121562292 60156201262158155156 9 62 85 0 0 0 0 0 0 0 0  
6 3 84 74156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
7 13156 87157155 87 91155156255256157154156 0 0 0 0 0 0 0 0  
7 15 87159155 87158155156227228156261262158155156 0 0 0 0 0 0  
7 13 87157155 87157155156261262158155156 87 0 0 0 0 0 0 0 0  
7 14157155 87158155156261262158155156 87158154 0 0 0 0 0 0 0  
7 10156257258157155156 20 85156 13 0 0 0 0 0 0 0 0 0 0 0  
7 10 85156 20156 20156 13 85156 13 0 0 0 0 0 0 0 0 0 0  
7 2 85156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
8 15156 87160155 87158155156227228156267268159155 0 0 0 0 0  
8 15156 87158155 87159155156227228156261262158155 0 0 0 0 0  
8 13156 87157155 87157155156267268159155156 0 0 0 0 0 0 0  
8 16 87157155 87157155156227228156255256157155 0 0 0 0 0  
8 13156 87157155156227228156255256157155156 0 0 0 0 0 0 0  
8 2 9156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
9 15156 87157155 87157154156227228156257258157155 0 0 0 0 0  
9 15156 87157155 87157155156227228156261262158154 0 0 0 0 0  
9 15156 87158155 87157155156229230227228156255256 0 0 0 0 0  
9 15157155156 87158155 87157155156227228156255256 0 0 0 0 0  
9 12157155156 87157154156257258157155156 0 0 0 0 0 0 0  
9 6 20 85 62 85 84 74 0 0 0 0 0 0 0 0 0 0 0 0  
9 1156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
10 13156 87158155 87157155156267268159155156 0 0 0 0 0 0 0  
10 13 87157155 87157155156263264158155156 87 0 0 0 0 0 0 0  
10 14157155 87160155156267268159153156 87159154 0 0 0 0 0 0  
10 12 87160155156255256157155156 87157155 0 0 0 0 0 0 0 0  
10 9156267268159155156 13 62 85 0 0 0 0 0 0 0 0 0 0 0  
10 3 84 74156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
11 13156 87157155 87157153156255256157154156 0 0 0 0 0 0 0  
11 15 87157155 87159155156227228156255256157155156 0 0 0 0 0  
11 13 87157154 87157155156261262158155156 87 0 0 0 0 0 0 0  
11 15157155 87158155156229230156263264158155156 87 0 0 0 0 0







25	15156	87159155	87157155156227228156261262158155	0	0	0	0	0
25	15156	87158155	87157155156229230156255256157155	0	0	0	0	0
25	13156	87157155	87158155156261262158155156	0	0	0	0	0
25	12	87158155	87158155156269270159155156	0	0	0	0	0
25	2	17156	0	0	0	0	0	0
26	13156	87157155	87157155156257258157155156	0	0	0	0	0
26	13	87157155	87157155156267268159155156	87	0	0	0	0
26	14157155	87157155156267268159155156	87159155	0	0	0	0	0
26	13	87159155156227228156255256157155156	17	0	0	0	0	0
26	5156	9	60	85	84	0	0	0
26	2	74156	0	0	0	0	0	0
27	13156	87158155	87157155156255256157154156	0	0	0	0	0
27	13	87158155	87157155156273274160153156	87	0	0	0	0
27	14157155	87160155156255256157155156	87159155	0	0	0	0	0
27	10	87157155156261262158155156	13	0	0	0	0	0
27	5	60	85	84	73156	0	0	0
28	13156	87160155	87158154156255256157155156	0	0	0	0	0
28	15	87158155	87157154156227228156255256157155156	0	0	0	0	0
28	15	87157155	87157155156227228156255256157155156	0	0	0	0	0
28	15	87157155	87157155156227228156273274160155156	0	0	0	0	0
28	5	17	85	62	85	84	0	0
28	2	73156	0	0	0	0	0	0
29	15156	87157155	87159155156227228156255256157155	0	0	0	0	0
29	13156	87157155	87158155156261262158155156	0	0	0	0	0
29	13	87157155	87158155156273274160155156	87	0	0	0	0
29	14157154	87158155156227228156255256157155156	0	0	0	0	0	0
29	2	17156	0	0	0	0	0	0
30	15156	87157155	87157154156227228156255256157155	0	0	0	0	0
30	13156	87157155	87157155156255256157155156	0	0	0	0	0
30	15	87157155	87158155156227228156255256157155156	0	0	0	0	0
30	12	87157155	87157154156255256157154156	0	0	0	0	0
30	2	13156	0	0	0	0	0	0

31	15171	95174170172170171233234171286287173170171	0	0	0	0	0	0	0
31	15	95173170	9517317017123523617128028172170171	0	0	0	0	0	0
31	15172168172170171298299	95169171172170	95174170	0	0	0	0	0	0
31	1217123323417128028172170171172170171	0	0	0	0	0	0	0	0
31	5	13	62	85	84	73	0	0	0
31	1156	0	0	0	0	0	0	0	0
32	16171172170	95174170171233234233234171284285172170	0	0	0	0	0	0	0
32	13171	9517317017217017128028172170171	95	0	0	0	0	0	0
32	14173170	95173170171282283172170171172170	95	0	0	0	0	0	0
32	16173170171233234233234171286287173170171	95173170	0	0	0	0	0	0	0
32	9171233234171	9156	17	85156	0	0	0	0	0
32	7	9156	17156	17	0	0	0	0	0
32	1156	0	0	0	0	0	0	0	0
33	14171	95174170172170171292293174170171172170	0	0	0	0	0	0	0
33	1417217017128028172170171	95176170172169171	0	0	0	0	0	0	0
33	1523323417128028172168171172170172170171286287	0	0	0	0	0	0	0	0
33	11173170171	95173170171	17	85	62	85	0	0	0
33	3	84	74156	0	0	0	0	0	0
34	1517117217017217017128028172170171172170172170	0	0	0	0	0	0	0	0
34	1217128028172170171172170	95173170171	0	0	0	0	0	0	0
34	15286287173170171	95173170172170171286287173170	0	0	0	0	0	0	0
34	8171	95174170171	9	85156	0	0	0	0	0
35	1417117217017217017128028172170171	95173170	0	0	0	0	0	0	0
35	1717217017123523623323417128028172170171172170172170	0	0	0	0	0	0	0	0
35	1217128028172168171	95174170	95174170	0	0	0	0	0	0
35	11171288289173170171	95173170171	13	0	0	0	0	0	0
35	1156	0	0	0	0	0	0	0	0
36	1417117217017216917128028172170171	95174170	0	0	0	0	0	0	0
36	13	95173169171286287173170171172170172170	0	0	0	0	0	0	0
36	15171286287173170171172170	95	98170171233234171	0	0	0	0	0	0
36	1128028172170171172170171	20156	20	0	0	0	0	0	0
36	9156	13	85156	17156	20156	9	0	0	0



43	1317128628.173170171172170172170172170171282283	0	0	0	0	0	0	0	0
43	16172170171172170 95176170171235236171292293174170	0	0	0	0	0	0	0	0
43	6171172170171 9156	0	0	0	0	0	0	0	0
44	16171 9517173170172170171233234233234235236171282283	0	0	0	0	0	0	0	0
44	14172170171 95173170172170171286287173170171	0	0	0	0	0	0	0	0
44	15172170 95174170171298299 96170171172170172170	0	0	0	0	0	0	0	0
44	12171233234171302303176170171172169171	0	0	0	0	0	0	0	0
44	10 20156 20 85156 20156 17 85156	0	0	0	0	0	0	0	0
44	5 13156 20 85156	0	0	0	0	0	0	0	0
45	13156 87158155 87157155156261262158155156	0	0	0	0	0	0	0	0
45	13 87159155 87157155156255256157155156 87	0	0	0	0	0	0	0	0
45	14157155 87157155156273274160155156 87157155	0	0	0	0	0	0	0	0
45	13 87159155156267268159155156 87160155156	0	0	0	0	0	0	0	0
45	11227228156255256157155156 13 85156	0	0	0	0	0	0	0	0
46	13156 87157155 87157155156255256157155156	0	0	0	0	0	0	0	0
46	13 87157155 87159155156255256157155156 87	0	0	0	0	0	0	0	0
46	16157155 87158155156227228227228156261262158155156	0	0	0	0	0	0	0	0
46	15 87157155 87157155156227228156261262158154156	0	0	0	0	0	0	0	0
46	11 87157153156255256157155156 17156	0	0	0	0	0	0	0	0
47	13156 87157155 87157155156261262158154156	0	0	0	0	0	0	0	0
47	15 87158155 87158155156229230156277278161154156	0	0	0	0	0	0	0	0
47	13 87161155 87159155156255256157155156 87	0	0	0	0	0	0	0	0
47	15157155 87158155156227228156255256157155156 87	0	0	0	0	0	0	0	0
47	10157155156261262158155156 17156	0	0	0	0	0	0	0	0
48	15156 87157155 87158155156229230156257258157154	0	0	0	0	0	0	0	0
48	15156 87159154 87157155156227228227228156261262	0	0	0	0	0	0	0	0
48	14158155156 87157155 87160155156259260157155	0	0	0	0	0	0	0	0
48	13156 87158154 87160155156261262158155156	0	0	0	0	0	0	0	0
48	13 87157155156227228156271272159155156 13	0	0	0	0	0	0	0	0
48	1156	0	0	0	0	0	0	0	0
49	13156 87158155 87157154156277278161155156	0	0	0	0	0	0	0	0
49	13 87157155 87157155156261262158155156 87	0	0	0	0	0	0	0	0

49	16157155	87159155	156227228227228156255256157154156	0	0	0	0	0
49	15	87157155	87157155	156227228156255256157155156	0	0	0	0
49	11	87160155	156261262158155156	20156	0	0	0	0
50	13156	87158155	87158155	156261262158155156	0	0	0	0
50	13	87157155	87159155	156261262158155156	87	0	0	0
50	14159155	87157155	156273274160155156	87157154	0	0	0	0
50	15	87158155	156227228227228156255256157154156	87	0	0	0	0
50	14158155	156227228156267268159155156	17	62	85	0	0	0
50	3	84	74156	0	0	0	0	0
51	15156	87157155	87158155	156227228156255256157155	0	0	0	0
51	15156	87157155	87157155	156227228156261262158155	0	0	0	0
51	13156	87158155	87157155	156255256157155156	0	0	0	0
51	13	87157155	87157155	156255256157154156	87	0	0	0
51	13158155	156227228156261262158155156	17	156	0	0	0	0
51	6	17	62	85	84	74156	0	0
52	15156	87157155	87157155	156227228227228227228156	0	0	0	0
52	16255256157155156	87157155	87157155	156227228227228227228	0	0	0	0
52	13156255256157155156	87157154	87157155	156	0	0	0	0
52	14265266158155156	87159154	87157155	156261262	0	0	0	0
52	16158155156	87158155	156227228227228156255256157155	0	0	0	0	0
52	9156	20156	20156	9	85156	13	0	0
52	5156	17156	17156	0	0	0	0	0
53	15156	87160155	87157155	156227228156265266158155	0	0	0	0
53	13156	87158155	87158155	156261262158154156	0	0	0	0
53	13	87157155	87157153	156255256157154156	87	0	0	0
53	15157155	87157155	156227228156261262158155156	87	0	0	0	0
53	11157155	156261262158155156	9	60	85	0	0	0
53	3	84	73156	0	0	0	0	0
54	13156	87158155	87157155	156261262158155156	0	0	0	0
54	13	87157155	87157155	156269270159155156	87	0	0	0
54	14159155	87137153	156261262158155156	87159154	0	0	0	0
54	13	87158154	156261262158155156	87157155156	0	0	0	0

54 12223230156355256157155156 17 85156 13 0 0 0 0 0 0 0 0 0  
54 8156 17156 17 85156 9156 0 0 0 0 0 0 0 0 0 0 0  
54 2 20156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
55 13156 87158155 87158155156255256157155156 0 0 0 0 0 0 0  
55 13 87157155 87157155156255256157155156 87 0 0 0 0 0 0 0  
55 14157155 87159155156255256157155156 87159155 0 0 0 0 0 0  
55 15 87158155156227228156255256157155156 87158155 0 0 0 0 0  
55 8156255256157155156 9156 0 0 0 0 0 0 0 0 0 0  
56 13156 87157155 87158154156255256157155156 0 0 0 0 0 0  
56 15 87157155 87157155156227228156267268159155156 0 0 0 0  
56 15 87159155 87157153156229230156255256157155156 0 0 0 0  
56 15 87157155 87157155156227228156255256157155156 0 0 0 0  
56 11 87158154156261262158155156 20156 0 0 0 0 0 0 0 0  
57 15216217215219215216357358217215216217214219215 0 0 0 0  
57 14216251252216361362218215216217215219215216 0 0 0 0  
57 15355356217215216217214217215216367368219215216 0 0 0 0  
57 5219213216 20156 0 0 0 0 0 0 0 0 0 0 0 0  
58 15216217214218215216361362218215216218215217215 0 0 0 0  
58 13216355356217215216217215217214216355356 0 0 0 0 0  
58 15217215216218215217215216357358217215216220215 0 0 0 0  
58 3216 20156 0 0 0 0 0 0 0 0 0 0 0 0  
59 16216218215217215216251252251252216355356217215216 0 0 0  
59 15220215217215216361362218215216219215217215216 0 0 0  
59 17253254216355356217215216220215219215216251252251252 0 0  
59 11216361362218215216219215216 17156 0 0 0 0 0 0 0  
60 15216217215217215216367368219215216218215217215 0 0 0  
60 15216361362218215216218214217215216253254251252 0 0 0  
60 15216355356217215216217214217215216355356217215 0 0 0  
60 10216217215216251252216 20 85156 0 0 0 0 0 0 0  
61 15216217213217215216355356217214216217215217215 0 0 0  
61 16216251252216355356217215216217215217215216251252 0 0 0  
61 15216355356217215216218215217214216373374220215 0 0 0



61	9216217215216251252216	17156	0	0	0	0	0	0	0	0
62	16216218215218215216251252216355356217215216219214	0	0	0	0	0	0	0	0	0
62	132172152163355356217214216219215217214216	0	0	0	0	0	0	0	0	0
62	1537374220215216217215219215216367368219215216	0	0	0	0	0	0	0	0	0
62	6217215216	13	85156	0	0	0	0	0	0	0
63	15216219215218215216355356217214216217215217214	0	0	0	0	0	0	0	0	0
63	13216355356217215216217215217215216367368	0	0	0	0	0	0	0	0	0
63	15219212216218215221215216355356217215216218215	0	0	0	0	0	0	0	0	0
63	4216	17	85156	0	0	0	0	0	0	0
64	15216217215217215216361362218215216218215217215	0	0	0	0	0	0	0	0	0
64	15216361362218215216218214217215216251252251252	0	0	0	0	0	0	0	0	0
64	15216355356217215216219215221215216355356217215	0	0	0	0	0	0	0	0	0
64	7216222215216	17	85156	0	0	0	0	0	0	0
65	15216220215217215216357358217215216220215217215	0	0	0	0	0	0	0	0	0
65	14216361362218215216218214218215216253254216	0	0	0	0	0	0	0	0	0
65	15361362218215216218215218215216355356217215216	0	0	0	0	0	0	0	0	0
65	5218215216	20156	0	0	0	0	0	0	0	0
66	16216217215217215216251252216355356217215216219215	0	0	0	0	0	0	0	0	0
66	13217215216363364218214216217215217215216	0	0	0	0	0	0	0	0	0
66	17363364218215216217214217215216253254216361362218214	0	0	0	0	0	0	0	0	0
66	6216217215216	17156	0	0	0	0	0	0	0	0
67	15216217215221215216355356217215216220215219215	0	0	0	0	0	0	0	0	0
67	13216361362218215216219215218215216355356	0	0	0	0	0	0	0	0	0
67	16217215216218212217215216251252216365366218215216	0	0	0	0	0	0	0	0	0
67	5218215216	20156	0	0	0	0	0	0	0	0
68	13156	87157155	87157155156255256157155156	0	0	0	0	0	0	0
68	13	87157155	87157155156255256157155156	87	0	0	0	0	0	0
68	14157155	87157154156263264158155156	87158155	0	0	0	0	0	0	0
68	11	87159155156267268159154156	20	85	0	0	0	0	0	0
68	5	62	85	84	74156	0	0	0	0	0
69	15156	87158155	87161154156227228156267268159155	0	0	0	0	0	0	0
69	13156	87160154	87159154156255256157155156	0	0	0	0	0	0	0

[illegible]

75	13	87157155	87158155	156261262158155156	87	0	0	0	0	0	0	0	0	0
75	12157154	87157155	156255256157155156	17	0	0	0	0	0	0	0	0	0	0
75	2	85156	0	0	0	0	0	0	0	0	0	0	0	0
76	15156	87157155	87157155	156227228156255256157155	0	0	0	0	0	0	0	0	0	0
76	13156	87157155	87158155	156263264158155156	0	0	0	0	0	0	0	0	0	0
76	13	87157155	87157155	156265266158155156	87	0	0	0	0	0	0	0	0	0
76	12157155	87157155	156267268159155156	13	0	0	0	0	0	0	0	0	0	0
76	2	85156	0	0	0	0	0	0	0	0	0	0	0	0
77	13156	87157155	87158155	156255256157155156	0	0	0	0	0	0	0	0	0	0
77	13	87157155	87157155	156255256157155156	87	0	0	0	0	0	0	0	0	0
77	14157155	87157155	156267268159155156	87157155	0	0	0	0	0	0	0	0	0	0
77	13	87157155	156229230156261262158155156	20	0	0	0	0	0	0	0	0	0	0
77	1156	0	0	0	0	0	0	0	0	0	0	0	0	0
78	15156	87158155	87157155	156227228156255256157155	0	0	0	0	0	0	0	0	0	0
78	15156	87157155	87161155	156229230156261262158155	0	0	0	0	0	0	0	0	0	0
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78	12	87158155	87157155	156261262158155156	0	0	0	0	0	0	0	0	0	0
78	2	17156	0	0	0	0	0	0	0	0	0	0	0	0
79	13156	87158154	87157154	156255256157154156	0	0	0	0	0	0	0	0	0	0
79	15	87157155	87158154	156227228156255256157154156	0	0	0	0	0	0	0	0	0	0
79	15	87157155	87158155	156227228156255256157154156	0	0	0	0	0	0	0	0	0	0
79	15	87157155	87157154	156227228156255256157155156	0	0	0	0	0	0	0	0	0	0
79	5	20	60	85	84	72	0	0	0	0	0	0	0	0
79	1156	0	0	0	0	0	0	0	0	0	0	0	0	0
80	16186187185187185186239240186305306187185186187185	0	0	0	0	0	0	0	0	0	0	0	0	0
80	17187185186241242239240186311312188185186189184188185	0	0	0	0	0	0	0	0	0	0	0	0	0
80	14186317318189185186187185187185186239240186	0	0	0	0	0	0	0	0	0	0	0	0	0
80	13311312188185186187185186311312188185186	0	0	0	0	0	0	0	0	0	0	0	0	0
80	6	17	62	85	84	73156	0	0	0	0	0	0	0	0
81	15186190185188185186305306187184186188185187185	0	0	0	0	0	0	0	0	0	0	0	0	0
81	14186241242186305306187185186187185189185186	0	0	0	0	0	0	0	0	0	0	0	0	0
81	17305306187185186187185189185186239240186311312	0	0	0	0	0	0	0	0	0	0	0	0	0

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88	1156	0	0	0	0	0	0	0	0
89	15156	87157155	87157155156229230156261262158155	0	0	0	0	0	0
89	13156	87159155	87157155156255256157154156	0	0	0	0	0	0
89	16	87157153	87157155156227228229230156261262158155	0	0	0	0	0	0
89	15156	87157155	87160155156229230156269270159155	0	0	0	0	0	0
89	13156	87158155	156227228156255256157155156	0	0	0	0	0	0
89	2	9156	0	0	0	0	0	0	0
90	13156	87157155	87157155156255256157155156	0	0	0	0	0	0
90	15	87158154	87157155156227228156261262158155156	0	0	0	0	0	0
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90	15158155	87157155156227228156257258157155156	87	0	0	0	0	0	0
90	14160155	156227228229230156261262158155156	20	0	0	0	0	0	0
90	1156	0	0	0	0	0	0	0	0
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91	13	87157155	87158154156261262158155156	87	0	0	0	0	0
91	15157155	87157155156227228156267268159152156	87	0	0	0	0	0	0
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93	14159155	87158155156261262158155156	87157155	0	0	0	0	0	0
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95 3 20 85156 0 0 0 0 0 0 0 0 0 0 0  
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98 9 20156 20156 13156 20 0 0 0 0 0 0 0 0  
98 1156 0 0 0 0 0 0 0 0 0 0 0 0  
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[illegible]

[illegible]



[illegible]

[illegible]

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124	3171	9156	0	0	0	0	0	0	0
125	161711/2169172170171235236171286287173170171172169	0	0	0	0	0	0	0	0
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125	1217128628/173170171172170	95174170171	0	0	0	0	0	0	0
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126	15171	95174170	95174170171233234171280281172170	0	0	0	0	0	0
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126	15172168172170171280281172170171	95173170172170	0	0	0	0	0	0	0
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128	15171	95176170	95173170171233234171280281172170	0	0	0	0	0	0
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129	12171233234171292293174170171	13	85156	0	0	0	0	0	0
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131	15	95173170	95173170171233234171286287173170171	0	0	0	0	0	0
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[illegible]



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163 6 85 62 85 64 73156 0 0 0 0 0 0 0 0 0 0  
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166 3 84 74156 0 0 0 0 0 0 0 0 0 0  
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167 1156 0 0 0 0 0 0 0 0 0 0 0 0  
168 15186187185189185186305306187185186187185190185 0 0 0  
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168 5 5 62 85 84 74 0 0 0 0 0 0 0 0  
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171	14186305306187185186190185186305306187185186	0	0	0	0	0
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175	15186317318189185186191183190185186311312188185	0	0	0	0	0
175	11186188185186305306187184186	2085	0	0	0	0
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176	163	173	18	189	185	186	187	185	186	239	240	186	31	13	12	188	185	186	0	0	0
176	5	20	85	62	85	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
176	2	74	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
177	13	156	87	157	155	87	158	155	156	261	262	158	155	156	0	0	0	0	0	0	
177	13	87	157	155	87	159	155	156	255	256	157	155	156	87	0	0	0	0	0	0	
177	15	157	155	87	159	155	156	227	228	156	255	256	157	155	156	87	0	0	0	0	
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177	10	157	155	156	255	256	157	155	156	17	156	0	0	0	0	0	0	0	0	0	
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178	13	87	157	155	87	157	155	156	273	274	160	155	156	87	0	0	0	0	0	0	
178	15	157	155	87	157	154	156	227	228	156	265	266	158	155	156	87	0	0	0	0	
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179	13	156	87	158	155	87	157	155	156	257	258	157	155	156	0	0	0	0	0	0	
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179	15	87	157	154	156	229	230	272	228	156	261	262	158	155	156	87	0	0	0	0	
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189	13201330331202200201204199202200201342343	0	0	0	0	0	0	0	0	0
189	162042002012032002020020124524620133233202200201	0	0	0	0	0	0	0	0	0
189	10203200201336337203200201	20156	0	0	0	0	0	0	0	0
190	1620120220020200201245246201330331202200201202200	0	0	0	0	0	0	0	0	0
190	13202200201342343204200201202200202200201	0	0	0	0	0	0	0	0	0
190	1736337203200201203199202200201245246201330331202200	0	0	0	0	0	0	0	0	0
190	12201202200201330331202200201	17	60	85	0	0	0	0	0	0
190	3	84	73156	0	0	0	0	0	0	0
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191	16201247248201330331202200201202200202200201247248	0	0	0	0	0	0	0	0	0
191	16245246201330331202200201202200202200201247248201	0	0	0	0	0	0	0	0	0
191	13338339201300201202200201336337203200201	0	0	0	0	0	0	0	0	0
191	6	13	85	62	85	84	74	0	0	0
191	1156	0	0	0	0	0	0	0	0	0
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192	14201342333702200201203200203200201245246201	0	0	0	0	0	0	0	0	0
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194	16201202199202200201247248201330331202200201202200	0	0	0	0	0	0	0	0	0

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194	15201330331202200201202200203200201247248245246	0	0	0
194	14201330331202200201202200201336337203200201	0	0	0
194	2 17156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0
195	13156 87159155 87157155156255256157155156	0	0	0
195	13 87157155 87157155156257258157155156 87	0	0	0
195	15157155 87157155156227228156255256157155156 87	0	0	0
195	12157155 87157155156255256157155156 9	0	0	0
195	2 85156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0
196	15156 87157155 87158155156227228156261262158155	0	0	0
196	13156 87157155 87157155156255256157155156	0	0	0
196	13 87157155 87157155156261262158155156 87	0	0	0
196	12157155 87160154156273274160155156 13	0	0	0
196	1156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0
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199	13156 87157155 87157155156273274160155156	0	0	0
199	13 87160155 87159155156255256157154156 87	0	0	0
199	14157155 87158155156261262158155156 87157155	0	0	0
199	13 87158155156229230156255256157155156 20	0	0	0
199	1156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0
200	13156 87157155 87157155156273274160155156	0	0	0
200	13 87157155 87158155156255256157154156 87	0	0	0
200	15157155 87160154156227228156257258157155156 87	0	0	0

200	12157155	87157155	156255256157155156	17	0	0	0	0	0	0	0
200	8	85156	9156	17156	13156	0	0	0	0	0	0
200	4	9156	20156	0	0	0	0	0	0	0	0
201	13156	87157155	87157155	154156261262158155156	0	0	0	0	0	0	0
201	13	87157155	87157155	156261262158155156	87	0	0	0	0	0	0
201	14158155	87158155	156255256157155156	87157155	0	0	0	0	0	0	0
201	13	87158155	156229230156255256157154156	17	0	0	0	0	0	0	0
201	1156	0	0	0	0	0	0	0	0	0	0
202	15156	87157155	87157155	156227228229230156255256	0	0	0	0	0	0	0
202	14157155	156	87157155	87159155	156255256157155	0	0	0	0	0	0
202	15156	87159152	87157155	156227228156255256157155	0	0	0	0	0	0	0
202	15156	87158155	87158155	156227228156255256157155	0	0	0	0	0	0	0
202	7156	20156	20	62	85	84	0	0	0	0	0
202	2	72156	0	0	0	0	0	0	0	0	0
203	15156	87157154	87157155	156227228156255256157155	0	0	0	0	0	0	0
203	15156	87157155	87158154	156229230227228156261262	0	0	0	0	0	0	0
203	14158155	156	87157154	87157155	156255256157155	0	0	0	0	0	0
203	13156	87157155	87157155	156261262158155156	0	0	0	0	0	0	0
203	2	17156	0	0	0	0	0	0	0	0	0
204	15156	87157155	87159155	156227228156255256157155	0	0	0	0	0	0	0
204	15156	87158155	87157155	156227228229230156261262	0	0	0	0	0	0	0
204	14158155	156	87160154	87157155	156255256157155	0	0	0	0	0	0
204	13156	87158155	87158155	156255256157154156	0	0	0	0	0	0	0
204	9	9	85156	20156	17	85156	20	0	0	0	0
204	5156	20156	13156	0	0	0	0	0	0	0	0
205	15156	87157155	87160155	156227228156261262158155	0	0	0	0	0	0	0
205	13156	87158155	87157155	156255256157155156	0	0	0	0	0	0	0
205	13	87158155	87158155	156255256157155156	87	0	0	0	0	0	0
205	14157155	87157155	156227228156255256157155156	0	0	0	0	0	0	0	0
205	3	9	85156	0	0	0	0	0	0	0	0
206	13156	87157154	87157154	156267268159155156	0	0	0	0	0	0	0
206	13	87159155	87159154	156261262158155156	87	0	0	0	0	0	0

[illegible]



212	1172170171286287173170171172169171	0	0	0	0	0	0	0	0
212	5	1	60	85	84	74	0	0	0
212	1156	0	0	0	0	0	0	0	0
213	14171172170	95	96170171286287173170171172168	0	0	0	0	0	0
213	14	95173170171288289173170171172169	95174170	0	0	0	0	0	0
213	14171286287173170171172170	95173170171233234	0	0	0	0	0	0	0
213	13171286287173170171	95173169171233234171	0	0	0	0	0	0	0
213	5	13	62	85	84	73	0	0	0
213	1156	0	0	0	0	0	0	0	0
214	14171172167	95174170171280281172170171172170	0	0	0	0	0	0	0
214	15	95173170171233234171280281172170171172170	95	0	0	0	0	0	0
214	16177170171235236171280281172170171172170	95174170	0	0	0	0	0	0	0
214	12171233234171280281172170171172169171	0	0	0	0	0	0	0	0
214	6	13	85	62	85	84	74	0	0
214	1156	0	0	0	0	0	0	0	0
215	15171172170172170171298299	96170171172170172169	0	0	0	0	0	0	0
215	14171235236171286287173169171	95174170172170	0	0	0	0	0	0	0
215	14171286287173170171172170	9517417017292293	0	0	0	0	0	0	0
215	9174170171172170171	20	85156	0	0	0	0	0	0
216	15171172170172170171292293174170171172170172170	0	0	0	0	0	0	0	0
216	13171286287173170171172170172170171282283	0	0	0	0	0	0	0	0
216	15172170171172170172170171286287173170171172170	0	0	0	0	0	0	0	0
216	9171235236171	13	85	60	85	84	0	0	0
216	2	72156	0	0	0	0	0	0	0
217	13171	95176170	95173170171286287173170171	0	0	0	0	0	0
217	15	95174170	95	96170171233234171292293174170171	0	0	0	0	0
217	16	95173170172170171235236233234171290291173170171	0	0	0	0	0	0	0
217	16	95173170172170171233234171280281172170171172170	0	0	0	0	0	0	0
217	6171233234171	20156	0	0	0	0	0	0	0
218	14171	95174170172170171286287173170171172170	0	0	0	0	0	0	0
218	14172170171286287173170171	95173170	95	96170	0	0	0	0	0
218	14171280281172170171	95173170172170171235236	0	0	0	0	0	0	0

[illegible]

224	15157155	87157155	156227228	156255256	157154156	87	0	0	0	0	0
224	15157155	87157155	156227228	156255256	157155156	87	0	0	0	0	0
224	13157155	156227228	156261262	158155156	17156	0	0	0	0	0	0
225	15156	87157155	87159154	156227228	156255256	157155	0	0	0	0	0
225	13156	87159155	87157155	156255256	157155156	0	0	0	0	0	0
225	15	87157155	87158155	156229230	156263264	158155156	0	0	0	0	0
225	16	87158155	87157155	156227228	156261262	158155	0	0	0	0	0
225	11156	87158155	156257258	157155156	17	0	0	0	0	0	0
225	1156	0	0	0	0	0	0	0	0	0	0
226	13156	87157155	87159155	156261262	158155156	0	0	0	0	0	0
226	13	87157155	87157155	156261262	158155156	87	0	0	0	0	0
226	16161155	87157155	156227228	156255256	157155156	0	0	0	0	0	0
226	13	87157155	87157155	156255256	157155156	87	0	0	0	0	0
226	11158155	156255256	157155156	17	62	85	0	0	0	0	0
226	3	84	74156	0	0	0	0	0	0	0	0
227	15156	87157154	87158154	156227228	156257258	0	0	0	0	0	0
227	14157154	156	87157154	87157155	156261262	158154	0	0	0	0	0
227	13156	87157155	87157155	156261262	158155156	0	0	0	0	0	0
227	13	87159155	87157155	156267268	159155156	87	0	0	0	0	0
227	11157155	156255256	157155156	20	62	85	0	0	0	0	0
227	3	84	73156	0	0	0	0	0	0	0	0
228	15156	87	91155	87157155	156227228	156261262	158155	0	0	0	0
228	13156	87157155	87157155	156255256	157154156	0	0	0	0	0	0
228	13	87159154	87157155	156269270	159155156	87	0	0	0	0	0
228	15158153	87157155	156227228	156255256	157155156	87	0	0	0	0	0
228	11157155	156255256	157155156	13	85156	0	0	0	0	0	0
229	15156	87159155	87157155	156229230	156267268	159155	0	0	0	0	0
229	15156	87157155	87158155	156227228	156273274	160155	0	0	0	0	0
229	13156	87157154	87157155	156261262	158155156	0	0	0	0	0	0
229	15	87157155	87157154	156227228	156261262	158155156	0	0	0	0	0
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229	5	60	85	84	74156	0	0	0	0	0	0

230	15156	87159154	8715715415622923015627J274160155	0	0	0	0	0	0
230	13156	87157155	87158155156261262158155156	0	0	0	0	0	0
230	13	87160155	87160155156269270159155156	87	0	0	0	0	0
230	14157155	87157155156263264158154156	87157155	0	0	0	0	0	0
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231	13156	87158155	87161155156263264158155156	0	0	0	0	0	0
231	15	87157155	87158155156227228156255256157155156	0	0	0	0	0	0
231	15	87159155	87159154156227228156255256157155156	0	0	0	0	0	0
231	13	87160155	87158155156255256157155156	87	0	0	0	0	0
231	12158155156227228156255256157155156	9	0	0	0	0	0	0	0
231	5	62	85	84	74156	0	0	0	0
232	13156	87158155	87157155156255256157155156	0	0	0	0	0	0
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232	10156257258157155156	17	85	62	85	0	0	0	0
232	3	84	73156	0	0	0	0	0	0
233	16216217215217215216251252216361362218215216218215	0	0	0	0	0	0	0	0
233	17217215216253254253254216361362218215216217215219215	0	0	0	0	0	0	0	0
233	16216251252216373374220215216218215217215216251252	0	0	0	0	0	0	0	0
233	10251252216367368219215216	13156	0	0	0	0	0	0	0
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234	15217215217215216355356217215216217214217215216	0	0	0	0	0	0	0	0
234	17251252251252216361362218215216219215217215216251252	0	0	0	0	0	0	0	0
234	9216355356217214216	13	62	85	0	0	0	0	0
234	3	84	73156	0	0	0	0	0	0
235	16216217215217215216251252216357358217215216217215	0	0	0	0	0	0	0	0
235	16218215216253254216355356217215216217215217215216	0	0	0	0	0	0	0	0
235	15253254216355356217215216217215217215216361362	0	0	0	0	0	0	0	0
235	5218215216	17156	0	0	0	0	0	0	0
236	15216220215217215216375376220215216218215218215	0	0	0	0	0	0	0	0
236	15216367368219215216217215217214216253254251252	0	0	0	0	0	0	0	0

236	1621636136221821521621715220215216251252216355356	0	0	0	0
236	721721521620628584	0	0	0	0
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237	273156	0	0	0	0
238	15216217215219215216369370219215216217215217215	0	0	0	0
238	13216373374220215216217215218215216367368	0	0	0	0
238	16219215216218215218215216251252216367368219215216	0	0	0	0
238	51385628584	0	0	0	0
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240	51362858473	0	0	0	0
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241	16216217215217215216253254251252216361362218215216	0	0	0	0
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242	72162015613156	9156	0	0	0
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243	162	162	192	152	172	152	162532542	163553562	172	152	162	172	15	0	0	0	0
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243	162	163	773	7822	12	152	162	172	152	172	152	162532542	16367368	0	0	0	0
243	62	192	152	16	20	85	156	0	0	0	0	0	0	0	0	0	0
244	13	156	87	158	155	87	157	155	156255256	157	155	156	0	0	0	0	0
244	15	87	157	155	87	159	155	156227228	156255256	157	155	156	0	0	0	0	0
244	15	87	157	155	87	157	154	156229230	15626	1262	158	155	156	0	0	0	0
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244	2	13	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0
245	15	156	87	157	155	87	157	155	156227228	156273274	160	155	0	0	0	0	0
245	13	156	87	157	155	87	157	155	156255256	157	155	156	0	0	0	0	0
245	15	87	157	155	87	158	155	156227228	15626	1262	158	155	156	0	0	0	0
245	12	87	159	155	87	158	155	15626	1262	158	155	156	0	0	0	0	0
245	6	20	85	62	85	84	72	0	0	0	0	0	0	0	0	0	0
245	1	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
246	13	156	87	157	155	87	159	155	15626	1262	158	155	156	0	0	0	0
246	13	87	157	155	87	157	155	156273274	160	155	156	87	0	0	0	0	0
246	14	157	155	87	157	155	156267268	159	154	156	87	157	155	0	0	0	0
246	10	87	157	155	156255256	157	155	156	13	0	0	0	0	0	0	0	0
246	5	62	85	84	74	156	0	0	0	0	0	0	0	0	0	0	0
247	15	156	87	161	154	87	157	155	156229230	156267268	159	155	0	0	0	0	0
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247	13	156	87	157	155	87	157	155	156255256	157	155	156	0	0	0	0	0
247	12	87	158	155	87	157	155	15626	1262	158	155	156	0	0	0	0	0
247	10	20	156	20	156	17	156	9	85	156	13	0	0	0	0	0	0
247	4	156	9	85	156	0	0	0	0	0	0	0	0	0	0	0	0
248	13	156	87	157	155	87	157	155	156255256	157	155	156	0	0	0	0	0
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248	15	87	157	155	87	159	155	156229230	156259260	157	155	156	0	0	0	0	0
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249	2	9	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0
249	13	156	87	160	155	87	157	155	15626	1262	158	155	156	0	0	0	0

249	16	87160155	87157154	156229230227228156255256157155	0	0	0	0	0
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250	10158155156	17	85156	20	85156	13	0	0	0
250	9156	17	85156	13	85156	13	85	0	0
250	1156	0	0	0	0	0	0	0	0
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251	15	87	91155	87158155156227228156261262158155156	0	0	0	0	0
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251	2	9156	0	0	0	0	0	0	0
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252	13156	87160155	87157155	156261262158155156	0	0	0	0	0
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252	12157155	87157155	156261262158155156	13	0	0	0	0	0
252	5	62	85	84	72156	0	0	0	0
253	13156	87158155	87157155	156255256157154156	0	0	0	0	0
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253	2	20156	0	0	0	0	0	0	0
254	15156	87157155	87157155	156229230156261262158155	0	0	0	0	0
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254	13	87157155	87157155	156259260157155156	87	0	0	0	0
254	12157155	87157155	156255256157155156	20	0	0	0	0	0
254	2	85156	0	0	0	0	0	0	0
255	15156	87157155	87157155	156227228227228227228156	0	0	0	0	0

255 14273274160155156 87161155 87157155156273274 0 0 0 0 0 0  
255 15160155156 87158155 87159154156227228156255256 0 0 0 0 0  
255 14157155156 87159154 87157155156267268159155 0 0 0 0 0  
255 3156 20156 0 0 0 0 0 0 0 0 0 0 0 0 0  
256 15186188185189185186311312188185186187185187185 0 0 0 0 0  
256 14186311312188185186189185187185186239240186 0 0 0 0 0  
256 15305306187184186103185187185186311312188185186 0 0 0 0 0  
256 10187185186317318189185186 20156 0 0 0 0 0 0 0 0  
257 15186187185191185186305306187185186189185187185 0 0 0 0 0  
257 13186305306187185186187185187185186305306 0 0 0 0 0  
257 16187185186187185187185186239240186305306187185186 0 0 0  
257 10188185186323324190185186 13156 0 0 0 0 0 0 0 0  
257 6 20 60 85 84 74156 0 0 0 0 0 0 0 0 0  
258 16186188185187185186239240239240186317318189185186 0 0 0  
258 14187185187185186305306187185186188185191185 0 0 0 0 0  
258 15186311312188185186187185189185186311312188185 0 0 0 0  
258 12186188185186311312188185186 17 62 85 0 0 0 0 0 0  
258 3 84 73156 0 0 0 0 0 0 0 0 0 0 0  
259 15186187185187185186311312188183186189185188184 0 0 0 0  
259 13186311312188184186187185192185186305306 0 0 0 0 0  
259 15187185186187185187185186311312188185186187185 0 0 0 0  
259 8186305306187185186 20156 0 0 0 0 0 0 0 0 0  
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260 8 85156 13156 9156 17 85 0 0 0 0 0 0 0 0 0  
260 3156 20156 0 0 0 0 0 0 0 0 0 0 0 0 0  
261 15186190185188185186305306187185186187184187185 0 0 0 0  
261 14186305306187185186188185187184186239240186 0 0 0 0  
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[illegible]

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268 14158 155156 87158154 87158155 156273274160155 0 0 0 0 0  
268 13156 87158155 87160155 156255256157155156 0 0 0 0 0  
268 13 87157155 87158155 156255256157155156 87 0 0 0 0 0  
268 10158 155156255256157153156 17156 0 0 0 0 0 0  
269 13156 87157155 87158155 156261262158155156 0 0 0 0 0  
269 16 87160155 87158155 156227228227228156255256157155 0 0 0  
269 13156 87159155 87157155 156255256157155156 0 0 0 0 0  
269 15 87157155 87157155 156227228156267268159155156 0 0 0  
269 13 87157155 156227228156255256157155156 13 0 0 0 0 0  
269 1156 0 0 0 0 0 0 0 0 0 0 0 0 0  
270 15156 87158155 87158155 156227228156261262158155 0 0 0 0  
270 15156 87157155 87157155 156227228156255256157155 0 0 0 0  
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270 5 13 60 85 84 73 0 0 0 0 0 0 0 0 0 0 0  
270 1156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
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271 14159 154156 87157154 87158155 156261262158155 0 0 0 0 0  
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271 13 87157155 156229230156255256157155156 9 0 0 0 0 0  
271 5156 17 62 85 84 0 0 0 0 0 0 0 0 0 0 0  
271 2 74156 0 0 0 0 0 0 0 0 0 0 0 0 0  
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273	15157155156	87158155	87158154156229230156267268	0	0	0	0	0
273	14159155156	87160155	87157155156261262158154	0	0	0	0	0
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275	14157155	87157155156271272159155156	87157155	0	0	0	0	0
275	12	87159155156261262158155156	87157155	0	0	0	0	0
275	9156275276160155156	13	62	85	0	0	0	0
275	3	84	74156	0	0	0	0	0
276	13156	87159155	87157155156255256157155156	0	0	0	0	0
276	13	87157155	87157155156255256157155156	87	0	0	0	0
276	14157155	87157155156267268159155156	87159155	0	0	0	0	0
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276	2	74156	0	0	0	0	0	0
277	15201202200202200201348349205200201202200203200	0	0	0	0	0	0	0
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278	9201202200201	5156	17	60	85	0	0	0
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285	6	13156	5 62 85 84	0	0	0	0
285	2	74156	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0	0
286	13156	87157155	87157155156255256157155156	0	0	0	0
286	13	87157155	87157155156255256157154156 87	0	0	0	0
286	16157155	87158155	156227228229230156255256157155156	0	0	0	0
286	12	87157155	87158155156255256157155156	0	0	0	0
286	2	20156	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0	0
287	13156	87157155	87157155156255256157154156	0	0	0	0
287	13	87157155	87157155156257258157155156 87	0	0	0	0
287	15159155	87157155	156227228156261262158155156 87	0	0	0	0
287	16158152	87157155	156227228227228156261262158155156	0	0	0	0
287	2	13156	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0	0
288	13156	87160155	87158155156267268159155156	0	0	0	0
288	13	87158155	87158155156255256157155156 87	0	0	0	0
288	14157155	87157154	156267268159155156 87158155	0	0	0	0
288	12	87157155	156255256157155156 20 62 85	0	0	0	0
288	3	84	73156 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0	0
289	15156	87157155	87 91155156229230229230156255256	0	0	0	0
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289	13156	87157155	87157153156267268159155156	0	0	0	0
289	12	87159155	87158155156261262158155156	0	0	0	0
289	6	20 62 85 84	74156 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0	0
290	13156	87157155	87158155156255256157155156	0	0	0	0
290	13	87157155	87157154156255256157155156 87	0	0	0	0
290	15158155	87157155	156229230156255256157155156 87	0	0	0	0
290	14157155	87159155	156229230156261262158155156	0	0	0	0
290	2	13156	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0	0
291	15156	87157155	87157155156227228156261262158155	0	0	0	0
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291	14159155	156 87161155	87157154156261262158155	0	0	0	0
291	15156	87157155	87157155156227228156255256157155	0	0	0	0

[illegible]

[illegible]

[illegible]



AD-A193 828

F-14 WING OUTER PANEL FATIGUE TEST SPECTRUM(U) NAVAL  
AIR DEVELOPMENT CENTER WARMINGSTER PA AIR VEHICLE AND  
CREE SYSTEMS TECHNOLOGY DIRECTORATE G S SEIDEL ET AL.  
APR 87 NADC-87056-60

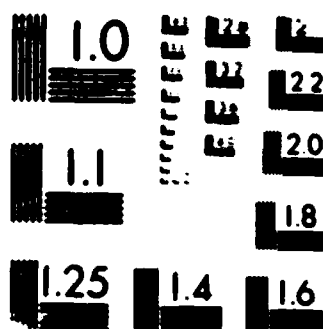
3/3

UNCLASSIFIED

F/G 1/3.3

NL





MICROCOPY RESOLUTION TEST CHART  
 (10X) (ANSI Z39.48-1968)

3-51

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315 13156 8/158154 8/157155156261262158155156 0 0 0 0 0  
315 15 8/157155 8/15715515622/228156255256157155156 0 0 0 0 0  
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315 11 8/159154156261262158155156 20 85 0 0 0 0 0 0 0  
315 5 60 85 84 73156 0 0 0 0 0 0 0 0 0 0 0 0  
316 15156 8/15/155 8/15715515622/228156267268159155 0 0 0 0 0  
316 15156 8/157153 8/15815515622/228156255256157155 0 0 0 0 0  
316 13156 8/15/155 8/157154156261262158155156 0 0 0 0 0  
316 15 8/158155 8/15715515622/228156263264158155156 0 0 0 0 0  
316 13 8/15715515622/228156261262158155156 20 0 0 0 0 0  
316 5 60 85 84 73156 0 0 0 0 0 0 0 0 0 0 0  
317 13156 8/15/155 8/158155156267268159154156 0 0 0 0 0  
317 13 8/158155 8/157155156255256157155156 87 0 0 0 0 0  
317 15161155 8/15815515622/228156255256157155156 87 0 0 0 0  
317 14157155 8/157155156261262158155156 87157155 0 0 0 0  
317 1215622/228156261262158155156 13 85156 0 0 0 0 0  
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318 13156 8/157155 8/158153156255256157155156 0 0 0 0  
318 16 8/159155 8/15715515622/228156261262158155 0 0 0  
318 15156 8/158155 8/15715515622/228156261262158155 0 0 0  
318 11156 8/157155156255256157155156 9 0 0 0 0 0  
318 2 85156 0 0 0 0 0 0 0 0 0 0 0  
319 13156 8/159155 8/157155156269270159154156 0 0 0 0  
319 15 8/157155 8/15715515622/228156261262158155156 0 0 0  
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319 5 62 85 84 73156 0 0 0 0 0 0 0 0  
320 15156 8/157155 8/15715515622/228156261262158154 0 0 0  
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320 13156 87157155 87157154156261262158155156 0 0 0 0 0 0 0 0  
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320 9 20156 17156 13 85156 9156 0 0 0 0 0 0 0 0  
320 3 17 85156 0 0 0 0 0 0 0 0 0 0 0 0  
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321 5216 9 62 85 84 0 0 0 0 0 0 0 0 0 0  
321 2 74156 0 0 0 0 0 0 0 0 0 0 0 0  
322 16216218215217215216253254216371372219215216217215 0 0 0  
322 13217215216367368219214216217214218215216 0 0 0 0  
322 15355356217215216217215217215216361362218215216 0 0 0  
322 3 17 85156 0 0 0 0 0 0 0 0 0 0 0 0  
323 15216217215217215216361362218214216217215217214 0 0 0  
323 13216355356217215216217215218215216355356 0 0 0 0  
323 13217215216219215217215216363364218215216 0 0 0 0  
323 7 9 85156 17 62 85 84 0 0 0 0 0 0 0 0  
323 2 73156 0 0 0 0 0 0 0 0 0 0 0 0  
324 16216218215217215216251252251252216355356217215216 0 0 0  
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324 16216251252216373374220215216218215217215216251252 0 0 0  
324 10251252216361362218215216 20156 0 0 0 0 0 0 0 0  
325 15216220215219215216367368219215216218215217215 0 0 0  
325 14216353254216357358217215216218215220215216 0 0 0 0  
325 17367368219215216217215217215216251252216363364218215 0 0  
325 3216 13156 0 0 0 0 0 0 0 0 0 0 0 0  
326 15216217215219215216355356217215216217215217214 0 0 0  
326 16216251252216355356217215216217215217215216251252 0 0 0  
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326 6219215216 20 85156 0 0 0 0 0 0 0 0 0 0  
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3-54

334	12157155	87158155	156255356	157155156	9	0	0	0	0	0
334	1156	0	0	0	0	0	0	0	0	0
335	13156	87157155	87158155	156257258	157155156	0	0	0	0	0
335	15	87157155	87158155	156292301	156267268	159155156	0	0	0	0
335	13	87160155	87158153	156355256	157155156	87	0	0	0	0
335	12157155	87158155	156255356	157155156	20	0	0	0	0	0
335	10156	20	85156	20156	17156	17	85	0	0	0
335	3156	13156	0	0	0	0	0	0	0	0
336	13156	87158155	87157155	156255356	157155156	0	0	0	0	0
336	13	87157155	87157153	156361262	158155156	87	0	0	0	0
336	14157154	87157155	156263264	158155156	87160155	0	0	0	0	0
336	11	87157154	156255256	157154156	17	85	0	0	0	0
336	1156	0	0	0	0	0	0	0	0	0
337	13156	87160155	87157155	156255356	157155156	0	0	0	0	0
337	16	87161155	87158155	156227228	227228156	25356157155	0	0	0	0
337	13156	87157155	87157155	156261262	158155156	0	0	0	0	0
337	15	87157155	87157155	156227228	156257258	157155156	0	0	0	0
337	5	13	85	62	85	84	0	0	0	0
337	2	73156	0	0	0	0	0	0	0	0
338	15156	87158155	87157155	156227228	156261262	158155	0	0	0	0
338	15156	87157155	87157155	156227228	156255256	157155	0	0	0	0
338	15156	87157155	87158155	156229230	156261262	158155	0	0	0	0
338	15156	87157155	87158155	156227228	156255256	157153	0	0	0	0
338	3156	9156	0	0	0	0	0	0	0	0
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340	13156	87157154	87158155	156261262	158154156	0	0	0	0	0
340	15	87157155	87159155	156227228	156255356	157155156	0	0	0	0
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346	272156	0	0	0	0	0	0	0	0
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347	15187185186311312188185186187185189185186239240	0	0	0	0	0	0	0	0
347	15186317318189185186187185188185186305306187185	0	0	0	0	0	0	0	0
347	1318618718518623924018631131218818518617	0	0	0	0	0	0	0	0
347	68515617608584	0	0	0	0	0	0	0	0
347	274156	0	0	0	0	0	0	0	0
348	15186187185187185186315316188185186187185187185	0	0	0	0	0	0	0	0
348	16186239240186305306187185186188185187185186241242	0	0	0	0	0	0	0	0
348	15186305306187185186187185188185186315316188185	0	0	0	0	0	0	0	0
348	131861871851862412421863173181891851865	0	0	0	0	0	0	0	0
348	68562858474156	0	0	0	0	0	0	0	0
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350	15188185186188185188185186311312188185186187185	0	0	0	0	0	0	0	0
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353	15	87157155	87157155	156227228156261262158155156	0	0	0	0	0	0	0
353	13	87157155	87157155	156255256157155156	87	0	0	0	0	0	0
353	14157155	87157155	156265266158155156	87157155	0	0	0	0	0	0	0
353	8156255256	157155156	9156	0	0	0	0	0	0	0	0
354	15156	87157155	87159155	156227228227228156255256	0	0	0	0	0	0	0
354	14157155156	87158155	87161153156255256157155	0	0	0	0	0	0	0	0
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354	11157155156361262158155156	17	62	85	0	0	0	0	0	0	0
354	3	84	74156	0	0	0	0	0	0	0	0
355	13156	87157155	87158154156255256157155156	0	0	0	0	0	0	0	0
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355	5	62	85	84	73156	0	0	0	0	0	0
356	15156	87157155	87158155156229230156261262158155	0	0	0	0	0	0	0	0
356	15156	87157154	87157155156227228156273274160155	0	0	0	0	0	0	0	0
356	15156	8715155	87159155156227228156267268159155	0	0	0	0	0	0	0	0
356	13156	87159155	87158155156273274160154156	0	0	0	0	0	0	0	0
356	11	87157154156261262158155156	17	85	0	0	0	0	0	0	0
356	1156	0	0	0	0	0	0	0	0	0	0
357	13156	87158155	87158155156261262158155156	0	0	0	0	0	0	0	0
357	13	87157155	87157155156261262158154156	87	0	0	0	0	0	0	0
357	15157154	87159154156227228156261262158155156	87	0	0	0	0	0	0	0	0
357	14157155	87157155156261262158155156	87160155	0	0	0	0	0	0	0	0
357	9156255256157155156	17	62	85	0	0	0	0	0	0	0
357	3	84	74156	0	0	0	0	0	0	0	0
358	15156	87157155	87159155156229230156261262158155	0	0	0	0	0	0	0	0

358	15156	87158155	87157155	15622923027228156261262	0	0	0	0	0
358	14158	155156	87160155	87158155	156255256157155	0	0	0	0
358	13156	87157155	87160155	156255256157155156	0	0	0	0	0
358	13	87157155	156229230156255256157155156	20	0	0	0	0	0
358	2	85156	0	0	0	0	0	0	0
359	13156	87157154	87158155	156257258157154156	0	0	0	0	0
359	15	87161155	87158155	156227228156261262158155156	0	0	0	0	0
359	13	87157155	87159155	156255256157155156	87	0	0	0	0
359	14157155	87157155	156267268159155156	87157155	0	0	0	0	0
359	8156255256157155156	17156	0	0	0	0	0	0	0
360	15156	87158155	87157155	156227228156267268159155	0	0	0	0	0
360	13156	87160155	87157155	156257258157155156	0	0	0	0	0
360	15	87159155	87158155	156227228156255256157155156	0	0	0	0	0
360	15	87157155	87158155	156229230156261262158155156	0	0	0	0	0
360	11	87157155	156273274160155156	20156	0	0	0	0	0
361	13156	87157155	87159155	156255256157155156	0	0	0	0	0
361	13	87157155	87	91154156255256157155156	87	0	0	0	0
361	14157155	87159155	156255256157155156	87157155	0	0	0	0	0
361	13	87158155	156255256157155156	87159155156	0	0	0	0	0
361	11227228156261262158155156	13	62	85	0	0	0	0	0
361	3	84	73156	0	0	0	0	0	0
362	13156	87157155	87157155	156261262158155156	0	0	0	0	0
362	13	87157155	87157155	156255256157155156	87	0	0	0	0
362	14159155	87157154	156255256157155156	87157154	0	0	0	0	0
362	15	87157155	156229230156257258157155156	87158155	0	0	0	0	0
362	9156261262158155156	20	60	85	0	0	0	0	0
362	3	84	73156	0	0	0	0	0	0
363	15156	87157155	87157155	156229230156263264158154	0	0	0	0	0
363	15156	87157155	87158155	156229230156255256157155	0	0	0	0	0
363	13156	87160155	87158155	156263264158155156	0	0	0	0	0
363	15	87159155	87157155	156227228156259260157154156	0	0	0	0	0
363	13	87159155	156227228156255256157155156	13	0	0	0	0	0

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376	16	87157155	87157154	156327228	156255256	157154156	0	0	0	0
376	12	87158154	87157155	156255256	157155156	0	0	0	0	0
376	2	13156	0	0	0	0	0	0	0	0
377	15156	87157155	87157155	156229230	156273274	160155	0	0	0	0
377	15156	87157155	87159155	156229230	156267268	159155	0	0	0	0
377	13156	87160155	87160155	156255256	157155156	0	0	0	0	0
377	12	87157155	87	91154	156255256	157155156	0	0	0	0
377	3	20	85156	0	0	0	0	0	0	0
378	13156	87157155	87159155	156255256	157155156	0	0	0	0	0
378	16	87160155	87158155	15627228	156255256	157155	0	0	0	0
378	13156	87157155	87158155	156255256	157155156	0	0	0	0	0
378	15	87159153	87157155	15627228	156255256	157155156	0	0	0	0
378	2	20156	0	0	0	0	0	0	0	0
379	15156	87157155	87157155	15627228	156259260	157155	0	0	0	0
379	13156	87157155	87159154	156263264	158154156	0	0	0	0	0
379	13	87157155	87157155	156255256	157155156	87	0	0	0	0
379	12157155	87157155	156255256	157155156	13	0	0	0	0	0
379	1156	0	0	0	0	0	0	0	0	0
380	13156	87158153	87157155	156255256	157155156	0	0	0	0	0
380	16	87157154	87160155	15627228	156261262	158155	0	0	0	0
380	13156	87157155	87158155	156255256	157155156	0	0	0	0	0
380	12	87157155	87157155	156273274	160155156	0	0	0	0	0
380	2	13156	0	0	0	0	0	0	0	0
381	15156	87157155	87157155	15627228	156261262	158155	0	0	0	0
381	13156	87157155	87157154	156261262	158155156	0	0	0	0	0
381	13	87157155	87159155	156261262	158154156	87	0	0	0	0
381	12158155	87157155	156255256	157155156	13	0	0	0	0	0
381	9156	17	85156	20156	17156	20	0	0	0	0
381	3156	13156	0	0	0	0	0	0	0	0
382	13156	87157155	87158155	156255256	157155156	0	0	0	0	0
382	13	87157155	87157155	156263264	158155156	87	0	0	0	0
382	14157155	87157155	156273274	160155156	87157155	0	0	0	0	0

382	10	8	15	155	156267268159155156	9	0	0	0	0	0	0	0	0	0	0	0	0	0
382	5	62	85	84	73156	0	0	0	0	0	0	0	0	0	0	0	0	0	0
383	15	171	95	174	170	95174170171233234171280281172170	0	0	0	0	0	0	0	0	0	0	0	0	0
383	14	171	11	2170	172170171280281172170171	95173170	0	0	0	0	0	0	0	0	0	0	0	0	0
383	15	172	170	171235236171292293174170171172170172170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
383	14	171	283287173170171172170171298299	96170171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
383	3	17	85156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
384	15	171	172170172170171300301	96170171172170172170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
384	12	171	280281172170171	95174170172170171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
384	15	286287173170171	95174170172170171286287173170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
384	12	171	172170171286287173170171	20	62	85	0	0	0	0	0	0	0	0	0	0	0	0	0
384	3	84	73156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
385	15	171	172170172170171286287173170171172170172170	172169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
385	14	171	233234171288289173170171172170172170171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
385	15	280281172170171172170	95174170171300301	96170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
385	11	171	172170171286287173169171	20	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0
385	6	156	20	62	85	84	72	0	0	0	0	0	0	0	0	0	0	0	0
385	1	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
386	16	171	172170172170171233234171280281172170171172170	172170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
386	13	172	170171288289173170171172170172170171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
386	15	298299	96170171172170172170171280281172170171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
386	13	95	96170171235236171280281172170171	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
386	5	62	85	84	74156	0	0	0	0	0	0	0	0	0	0	0	0	0	0
387	15	171	172170172170171292293174170171172170172170	172170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
387	15	171	233234171286287173170171	95173170172170171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
387	14	233234171286287173170171172170	95173170171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
387	14	280281172170171	95173170171280281172170171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
387	3	20	85156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
388	13	171	951731701712170171286287173170171	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
388	14	173	170172170171286287173170171172170172170	172170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
388	13	171	286287173170171	95173170	95173170171	0	0	0	0	0	0	0	0	0	0	0	0	0	0
388	13	280281172170171172170171282283172170171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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394	9286287173170171	13 62 85 84	0 0 0 0 0 0 0 0 0 0 0 0
394	2 74156	0 0 0 0 0 0 0 0 0 0 0 0	
395	15171172170	95173170171233234171286287173170171	0 0 0 0 0 0 0 0
395	14 95174169172170171286287173170171172170	95 0 0 0 0 0 0 0 0	
395	1617417017123323423323417128028172170171	95173170 0 0 0 0 0 0 0	
395	12172169171292293174170171	95174170171 0 0 0 0 0 0 0	
395	8286287173170171	20 85156 0 0 0 0 0 0 0 0 0 0	
396	15171 9517317017217017123323417128028172170171	0 0 0 0 0 0 0 0	
396	15 9517617017217017128028172170171172170172170	0 0 0 0 0 0 0 0	
396	12171284285172170171172170	95174169171 0 0 0 0 0 0 0	
396	1628628717317017117217017123523617128028172170171	0 0 0 0 0 0 0 0	
396	2 13156	0 0 0 0 0 0 0 0 0 0 0 0	
397	13156	87160155 87158155156255256157155156 0 0 0 0 0 0 0	
397	13 87 91155	87157155156261262158155156 87 0 0 0 0 0 0 0	
397	15159154	87157155156227228156261262158155156 87 0 0 0 0 0 0 0	
397	16157155	87158155156229230227228156261262158155156 0 0 0 0 0 0 0	
397	11 87157155156255256157155156	13 85 0 0 0 0 0 0 0 0 0 0	
397	5 62 85 84 73156	0 0 0 0 0 0 0 0 0 0 0 0	
398	15156	87158155 87159155156229230156255256157155 0 0 0 0 0 0 0	
398	13156	87157154 87157155156267268159154156 0 0 0 0 0 0 0	
398	13 87158155	87158155156261262158155156 87 0 0 0 0 0 0 0	
398	15157155	87157155156227228156255256157155156 87 0 0 0 0 0 0 0	
398	14159155156227228156255256157155156	20 62 85 0 0 0 0 0 0 0 0	
398	3 84 74156	0 0 0 0 0 0 0 0 0 0 0 0	
399	15156	87158154 87158155156229230227228156257258 0 0 0 0 0 0 0	
399	14157155156	87157155 87157155156255256157155 0 0 0 0 0 0 0	
399	13156	87157155 87159155156257258157155156 0 0 0 0 0 0 0	
399	15 87159155	87157155156227228156261262158154156 0 0 0 0 0 0 0	
399	10 87157155156261262158155156	13 0 0 0 0 0 0 0 0 0 0 0	
399	5 60 85 84 73156	0 0 0 0 0 0 0 0 0 0 0 0	
400	13156	87158155 87159155156261262158154156 0 0 0 0 0 0 0	
400	13 87157154	87159155156259260157155156 87 0 0 0 0 0 0 0	

400	14157155	87157155	156261262158155156	87159155	0	0	0	0	0
400	12	87157155	156261262158155156	87158155	0	0	0	0	0
400	11	56267268159155156	17156	13	60	85	0	0	0
400	3	84	72156	0	0	0	0	0	0
401	15156	87159155	87159155	156227228156261262158155	0	0	0	0	0
401	13156	87157155	87158155	156255256157155156	0	0	0	0	0
401	15	87158155	87158155	156227228156261262158155156	0	0	0	0	0
401	13	87157155	87158155	156261262158155156	87	0	0	0	0
401	10157155	156255256157155156	20156	0	0	0	0	0	0
402	13156	87157155	87157155	156261262158155156	0	0	0	0	0
402	15	87157155	87157155	156227228156255256157155156	0	0	0	0	0
402	13	87159155	87157154	156261262158155156	87	0	0	0	0
402	15157155	87160155	156227228156261262158155156	87	0	0	0	0	0
402	10157155	156261262158154156	13156	0	0	0	0	0	0
402	9	20	85156	20156	13156	0	0	0	0
402	2	20156	0	0	0	0	0	0	0
403	15156	87157155	87157154	156229230156255256157155	0	0	0	0	0
403	15156	87158155	87158151	156229230156261262158155	0	0	0	0	0
403	15156	87158155	87157155	156227228156261262158155	0	0	0	0	0
403	13156	87159155	87157155	156255256157155156	0	0	0	0	0
403	11	87157155	156267268159155156	20	85	0	0	0	0
403	5	62	85	84	74156	0	0	0	0
404	13156	87157155	87157154	156255256157155156	0	0	0	0	0
404	13	87161155	87157155	156255256157155156	87	0	0	0	0
404	14157155	87157155	156267268159155156	87158155	0	0	0	0	0
404	12	87160155	156261262158152156	87157155	0	0	0	0	0
404	8	156267268159155156	20156	0	0	0	0	0	0
405	13156	87157155	87157155	156261262158155156	0	0	0	0	0
405	15	87158155	87157155	156229230156255256157155156	0	0	0	0	0
405	15	87157155	87161155	156229230156257258157155156	0	0	0	0	0
405	13	87158155	87157155	156255256157155156	87	0	0	0	0
405	10159155	156255256157153156	20156	0	0	0	0	0	0



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419	16216217215219215216251252216357358217215216217215	0	0	0	0
419	16218215216253254216355356217215216217215220215216	0	0	0	0
419	15251252216355356217215216217214217215216355356	0	0	0	0
419	1221721521625125221636136221821521613	0	0	0	0
419	1156	0	0	0	0
420	15156	87157155	87157155	156227228156255256157155	0
420	15156	87157155	87157155	156229230227228156255256	0
420	15157153156	87157155	87157155	156227228156257258	0
420	14157155156	87157155	87157155	156267268159155	0
420	6156	20	85	62	85
420	2	74156	0	0	0
421	15156	87157155	87158155	156227228156261262158154	0
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421	15156	87158155	87158155	156227228156261262158155	0
421	13156	87157155	87157154	156261262158155156	0
421	5	17	85	62	85
421	2	74156	0	0	0
422	13156	87157155	87157155	156255256157155156	0
422	13	87157155	87159155	156261262158155156	87
422	14157155	87158154	156255256157155156	87161155	0
422	13	87158155	156227228156255256157155156	20	0
422	5	62	85	84	74156
423	15156	87157155	87157155	156227228156255256157153	0
423	15156	87157154	87157154	156227228156261262158155	0
423	15156	87160155	87157155	156229230156255256157155	0
423	13156	87157155	87157155	156263264158155156	0
423	2	13156	0	0	0
424	15156	87157153	87159155	156227228156261262158155	0
424	15156	87157155	87160152	156227228156255256157155	0
424	13156	87158155	87159155	156255256157155156	0
424	15	87160155	87158155	156227228156261262158155156	0
424	2	20156	0	0	0

425	15156	87158155	87157155	156227228156255256157155	0	0	0	0	0
425	13156	87157155	87161155	156261262158155156	0	0	0	0	0
425	13	87159155	87159155	156269270159155156	87	0	0	0	0
425	12159155	87158154	156261262158155156	13	0	0	0	0	0
425	1156	0	0	0	0	0	0	0	0
426	13156	87157155	87157155	156255256157155156	0	0	0	0	0
426	13	87	91155	87157155156267268159155156	87	0	0	0	0
426	14158155	87157155	156255256157155156	87159155	0	0	0	0	0
426	13	87157155	156227228156261262158155156	9	0	0	0	0	0
426	1156	0	0	0	0	0	0	0	0
427	13156	87159154	87159155	156261262158155156	0	0	0	0	0
427	15	87157155	87157155	156227228156261262158155156	0	0	0	0	0
427	15	87157155	87157155	156227228156269270159155156	0	0	0	0	0
427	12	87158155	87159155	156255256157155156	0	0	0	0	0
427	2	20156	0	0	0	0	0	0	0
428	15156	87158155	87157154	156227228156261262158155	0	0	0	0	0
428	13156	87157154	87158155	156257258157155156	0	0	0	0	0
428	13	87158155	87158155	156267268159155156	87	0	0	0	0
428	12158155	87157155	156261262158155156	20	0	0	0	0	0
428	5	62	85	84	73156	0	0	0	0
429	15156	87158155	87158155	156227228156267268159155	0	0	0	0	0
429	13156	87157155	87157153	156255256157155156	0	0	0	0	0
429	15	87157155	87157155	156229230156255256157155156	0	0	0	0	0
429	12	87160155	87157155	156261262158155156	0	0	0	0	0
429	2	13156	0	0	0	0	0	0	0
430	13156	87157155	87157155	156255256157154156	0	0	0	0	0
430	16	87160155	87157155	156229230227228156255256157155	0	0	0	0	0
430	13156	87159155	87159155	156255256157155156	0	0	0	0	0
430	12	87158155	87157155	156255256157155156	0	0	0	0	0
430	8	17156	20	85156	13156	13	0	0	0
430	5156	9156	13156	0	0	0	0	0	0
431	13156	87158155	87160155	156261262158154156	0	0	0	0	0

431	15	87158155	87157155	156227228156257258157155156	0	0	0	0	0
431	13	87157155	87157155	156263264158155156	87	0	0	0	0
431	12	157155	87161155	156255256157155156	13	0	0	0	0
431	11	56	0	0	0	0	0	0	0
432	15	186187185190185186311312188185186187185187185	0	0	0	0	0	0	0
432	16	186241242239240186317318189185186188185187185186	0	0	0	0	0	0	0
432	15	239240239240186305306187183186187185188185186	0	0	0	0	0	0	0
432	14	305306187185186188184188185186239240186	20	0	0	0	0	0	0
432	5	62	85	84	72156	0	0	0	0
433	15	186187185189185186311312188184186187185187185	0	0	0	0	0	0	0
433	14	186241242186305306187184186187184187185186	0	0	0	0	0	0	0
433	15	13314188185186187185187185186305306187185186	0	0	0	0	0	0	0
433	10	187185189185186	20156	17156	9	0	0	0	0
433	8	85156	17	85156	13156	9	0	0	0
433	11	56	0	0	0	0	0	0	0
434	15	186188185187185186311312188185186187185187185	0	0	0	0	0	0	0
434	16	186239240186307308187185186187185187185186239240	0	0	0	0	0	0	0
434	15	186311312188185186187185189185186307308187185	0	0	0	0	0	0	0
434	8	186190185187185186	20156	0	0	0	0	0	0
435	16	186187185188184186239240186317318189185186187185	0	0	0	0	0	0	0
435	13	188185186311312188185186187184187185186	0	0	0	0	0	0	0
435	17	305306187185186187185189185186239240186305306187185	0	0	0	0	0	0	0
435	8	186187185187185186	20156	0	0	0	0	0	0
436	15	1861871851901841866311312188185186187185187185	0	0	0	0	0	0	0
436	16	186239240186305306187185186187185189185186239240	0	0	0	0	0	0	0
436	15	186311312188185186187185187185186305306187185	0	0	0	0	0	0	0
436	12	186187185187184186239240186	17	85156	0	0	0	0	0
437	16	186188185187185186239240186311312188185186187184	0	0	0	0	0	0	0
437	15	188185186239240186311312188185186187185189184	0	0	0	0	0	0	0
437	16	186305306187185186187185187185186241242239240186	0	0	0	0	0	0	0
437	12	327328191185186187184187185186	17156	0	0	0	0	0	0
438	16	186187185187185186241242186305306187185186188185	0	0	0	0	0	0	0

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438	17	188	185	186	24	12	42	23	92	40	186	305	306	187	185	186	189	185	188	185	0	0	0
438	14	186	23	92	40	186	31	13	12	188	185	186	188	185	188	185	186	0	0	0	0	0	0
438	11	305	306	187	185	186	190	185	187	185	186	9	0	0	0	0	0	0	0	0	0	0	0
438	11	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
439	16	186	189	185	188	185	186	24	12	42	186	317	318	189	184	186	188	185	0	0	0	0	0
439	15	187	185	186	307	308	187	185	186	187	185	189	184	186	24	12	42	0	0	0	0	0	0
439	16	186	317	318	189	184	186	190	185	187	185	186	24	12	42	186	313	314	0	0	0	0	0
439	11	188	185	186	189	185	187	184	186	20	62	85	0	0	0	0	0	0	0	0	0	0	0
439	3	84	74	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
440	15	186	189	185	187	185	186	31	13	12	188	185	186	187	185	188	185	0	0	0	0	0	0
440	16	186	23	92	40	186	31	13	12	188	185	186	189	185	187	185	186	23	92	40	0	0	0
440	15	186	31	13	12	188	185	186	188	185	187	185	186	31	13	12	188	185	0	0	0	0	0
440	12	186	187	185	187	185	186	23	92	40	186	9	85	156	0	0	0	0	0	0	0	0	0
440	9	17	156	17	156	13	85	156	9	156	0	0	0	0	0	0	0	0	0	0	0	0	0
440	2	13	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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